Explaining and Addressing Gender Differences in the New Zealand Compulsory School Sector

A Literature Review

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Preface

This review of the research literature was commissioned in 1999 by the Curriculum Division of the Ministry of Education to explain gender differences in compulsory education for the period 1989 to 1999. The impetus for undertaking such a review stemmed from increasing concern among policymakers and practitioners that the education of boys in Aotearoa New Zealand was at risk.

A prior analysis of data held by the Ministry of Education on the achievement and participation of male and female students in the New Zealand school sector was carried out by Angelique Praat. Angelique was at that time a member of the Research Division. This analysis informed the subsequent literature review in that it identified, early on, some of the complexities around the issue of the achievement and participation of students, with a focus on gender.

Subsequently Adrienne Alton-Lee, an independent contract researcher, and Angelique Praat jointly carried out the literature review. This was deemed to be a very successful arrangement, from the point of view of the authors and of the contractor. Each brought different skills, qualities, understandings and knowledge to the task at hand, resulting in a review that not only challenges the reader personally, but also policy makers and practitioners.

The authors’ views are their own, informed by the literature and the data, and by their theoretical positioning. As is practice with any commissioned work, the Ministry of Education accepts that there may be views expressed or recommendations made by the authors that are not consistent with its policies, or that there are constraints in addressing any recommendations, either in the long or short term. However it acknowledges the importance of giving the authors the freedom to express these.
Abstract

This review of research was commissioned by the Ministry of Education to explain gender differences in compulsory education during the period 1989-1999. The specifications required particular focus on primary, Māori and Pacific students, and disparities by gender in participation, achievement and social outcomes. The review explores assessment patterns for each of the seven curriculum areas and considers available research in the light of these patterns. Over 450 studies are reviewed.

The research is situated within a consideration of gender policy in Aotearoa New Zealand; and infrastructures available to address gender in education. The research reveals that schooling actively stratifies student achievement by gender, although gender disparities are the least marked of disparities by school decile level and ethnicity. Poorer performance is evident for students from low decile schools and Pacific girls and boys. Māori students’, and in particular Māori boys’, achievement is much lower than overall means; but those relatively few Māori boys who do senior science perform above the international mean.

Variations in patterns of relatively higher male or female achievement relate to the gendered nature of curriculum itself. Boys achieve more highly in social studies, for example, while girls achieve more highly in literacy. Literacy and arts are positioned as feminine and science is positioned as masculine. The undervaluing of the feminine in our culture is evident in boys’ resistance to feminine areas of curriculum, and in the heteronormative constraints that police boys behaviour. Technology education provides a site where traditionally gendered curriculum divisions are confounded.

The review itself is constituted as a resource for teachers in developing an informed and research-based dialogue around issues of gender, identity and behaviour. The implications stemming from the review address the stratification of schooling, the status of the teaching profession, the need for research, revised teacher education policies and immediate curricular priorities where overall student performance is poor at the primary level such as mathematics.
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EXECUTIVE SUMMARY

In recent years there has been reported widespread local and international concern about the performance of boys in education. In response to such concern, the New Zealand Ministry of Education carried out an initial review of gender patterns in student performance, drawing upon data held within the Ministry, mostly covering the period 1986 to 1997. The resultant report provided an overview of the participation and achievement of male and female students in English, mathematics and science (Praat, 1999). That report revealed contradictory and apparently equivocal findings, showing girls and boys to variously achieve more highly at different levels of the school and in different subject areas.

In the light of these findings, the Ministry of Education commissioned this present review of recent literature on the range of factors contributing to gender differences in education in the compulsory school sector. The Ministry of Education’s specifications for the review stated a particular interest in a focus on research at the primary school level and also called for attention to be paid to learning and social outcomes for Māori and Pacific male and female students, and students at risk of not fulfilling their educational potential. The review specifications required answers to the following questions:

- What are the key factors contributing to gender differences in learning, participation and social outcomes?
- What strategies or policies have been used to address gender differences in learning, student participation and social outcomes?
- How effective have these strategies/policies been and under what circumstances?

We used an iterative approach to searching the literature and developing the framework for this review. Successive searches, readings of the literature and advice from the advisory committee resulted in the current organisation of the review which is presented in four general sections: Context and Approach; Gender and Curriculum; Explaining Gendered Behaviour Patterns and Overview and Implications. The content, nature and scope of each of these sections is outlined as follows, together with a brief outline of some major findings/points of interest.

Context and Approach

In the first part, Chapter One of the Context and Approach section, we make transparent the specifications for the literature review and outline the contents of each of the succeeding chapters. We signal the interest in school participation and achievement, particularly at the primary level, and the call to focus on the education of Māori and Pacific students. We broaden the focus from gender to include other aspects of identity, for example: social class, ethnicity, culture, and sexuality, explaining that gender differences and gender effects are produced in and by students' local social and cultural contexts.

In Chapter Two: Methodology, the rationale for the structure of the literature review and our approach to using curriculum as an organising structure is explained. We suggest that explicit attention to all the curricula areas is important because knowledge itself has been imbued with gendered associations through its organisation within disciplinary and curricula areas.

Chapter Three: Gender Policy in Context situates our review within a brief overview of the New Zealand educational context, the wider context of the labour market, and policies, infrastructures and resourcing constraints over the focus decade of 1989–1999. Our considerations of gender occur within
the context of a shift in government policy that positions education as the engine of a knowledge society. Patterns of men’s and women’s participation in the wider society are rapidly changing. Males earn more than females in the paid workforce but the gender gap has reduced markedly from 1981, when men earned on average two-thirds more than women. Recent statistics show men to be earning one-sixth more than women. The age at which students are legally able to leave school has risen during the decade of study (from 15 years to 16 years of age) and schools have been catering for a group of students who would previously have been in the workforce. Male unemployment figures rose above female unemployment figures during the decade of focus.

- New Zealand expenditure on primary education is substantially less than the average (mean) amount spent across all OECD countries, and expenditure on secondary education is slightly less.
- Teacher pay, lower student–teacher ratios and teacher education have been found to be positively related to students’ future earnings.
- Teacher education shows the most cost-effective benefit in student achievement.
- New Zealand has higher proportions of female teachers than the average (mean) proportion for all OECD countries and the OECD figures show a strong relationship between higher teacher salaries and higher proportions of males in teaching. New Zealand teachers’ salaries are comparatively low by OECD standards.
- While highly qualified, committed men and women are needed in teaching, USA research suggests that males in pre-service teacher education and in the teaching force are likely to be less qualified and less committed to schools.
- Primary and secondary teachers in Aotearoa New Zealand are working about 54 to 60 hours a week. Little additional time is available for professional development.
- Researchers in the school effectiveness, school improvement, and school change fields have found teachers to be far more important in school development than previously thought. Teachers are reported to contribute to about 40 percent of the variance in student scores while schools contribute to about 16 percent of the variance.
- Recent New Zealand research shows that schools have more effect as stratification of schools is increased and compounded by social class and school-mix influences.
- The market model of school choice has increasingly stratified schools by social class and ethnicity.
- There have been some opportunities offered to girls by the market model although in the UK some communities have implemented practices that constrain girls’ opportunities.
- There are signals that the market model has been problematic for some boys. In the UK disproportionately more boys’ than girls’ schools have been closed down.
- New Zealand boys, particularly Māori boys, have been over-represented in increasing rates of suspensions. A ‘turbulence’ factor — the effect of problems associated with a constantly changing school population — has been identified in low decile New Zealand schools that have been losing students.

A range of theories has been used to explain gender differences in education: essentialism, social learning theory, cognitive development theory, gender schema theory, psychoanalytic theory, social
constructionist theories and post-structural theories. We have provided a brief outline of these theories to enable readers to evaluate the explanatory power of the theories in the light of the research evidence reviewed.

Current gender policy is chiefly incorporated in the National Education Goals and The National Administration Guidelines, which require a safe physical and emotional environment to be provided for students and equal opportunity schooling.

The new national curriculum that has been developed since 1993 requires a gender-inclusive curriculum that meets the needs of boys and girls. These policies have arisen out of a history of equity discourses in Aotearoa New Zealand, including social democracy, equal opportunities, equality of the sexes, girls as deficient or disadvantaged, gender differences, and equitable outcomes. Girls rather than boys were the focus of gender policies until the mid 1990s when boys and masculinities became an increasing research focus.

The Girls and Women Section in the Ministry of Education was disestablished in 1992 and no other infrastructure to resource gender policy issues was put in place.

- Federal initiatives in Australia have produced a gender equity framework focused on heterogeneous groups of girls and boys. These initiatives have been supported by action plans, outcome indicators and monitoring strategies. The Australian framework focuses on understanding the process of construction of gender curriculum teaching and learning, violence and school culture, post-school pathways, and supporting change.

During the decade focused on for this review, teacher education has been deregulated. A partial market model has prevailed but remuneration has been set at a ceiling level for primary teachers after a three-year pre-service training. The partial market model has constrained New Zealand teacher education for primary training to operate at the low end of the international ‘market’. Internationally, four-year training is common and five-year programmes have been introduced because of the strong relationship between teacher education and student achievement shown across curriculum areas.

Because of the changes in teacher education for primary teachers in Aotearoa New Zealand and the separation of research and teaching in the tertiary sector, a substantial body of the research reported in this review occurred in the contexts of courses and programmes that no longer exist.

Gender and Curriculum

The central section of the review, Gender and Curriculum provides a consideration of the research literature on gender and education within each of the seven essential learning areas of the New Zealand Curriculum Framework. Patterns of gendered achievement and participation extant among New Zealand students with respect to ethnic and cultural identities are presented for each learning area. Local and international research illuminating these patterns is reviewed within the body of each of Chapters Four to Ten.

Chapter Four: Science Curriculum considers the literature focused on science and gender. The evidence suggests that schools play an active role in the stratification of students' science achievement by social class, ethnicity and gender, middle primary school level, with Māori and Pacific students performing poorly on science items in the IEA\(^1\) Third International and Mathematics and Science Study (TIMSS).

\(^1\) The IEA – The International Association for the Evaluation of Educational Achievement – is an international non-profit cooperative of research institutions. Principal purposes of the IEA include undertaking comparative educational research on
Physics is the subject which reflects one of the strongest patterns of gendered participation in the senior school.

Teachers have engaged in a wide variety of action research studies to address a recurring pattern of verbal dominance by boys in science and the traditional positioning of science as a masculine domain. Alternative pedagogies have been developed. These include: facilitating exploratory talk; the use of student questions in the interactive teaching approach; structured cooperative group tasks; the integration of science and technology with social studies; and the use of literacy and diagrammatic representations in science to better reflect the daily work of actual scientists.

- Post-structuralist theory has been proposed as a tool for teachers and students to use to deconstruct the binaries and oppositional male/female discourses underpinning science. New Zealand science teachers at the upper primary level are not confident in their science knowledge.

- The initiative to develop a Māori science curriculum and the dictionary of Māori scientific and technological terms constitutes a major development.

- Relatively large proportions of Māori drop out of science early but Māori boys who went on to senior secondary school achieved more highly than the international average for the IEA Third International Mathematics and Science Study (TIMSS). Māori girls performed below the international mean for TIMSS and Pacific girls and boys generally did poorly on the assessment measures used within the study. New Zealand's overall mean on TIMSS science literacy items devised for secondary school students in their final year at school (Years 12 or 13) was very high, reflecting a strong contrast between science teaching at primary and intermediate levels and science teaching at the secondary level.

The relationship between mathematics and gender is considered in Chapter Five: Mathematics Curriculum. Patterns of achievement in mathematics in Aotearoa New Zealand show a wide diversity of outcomes with respect to gender, ethnicity and social class, with gender differences often being the smallest of the group differences. Patterns of achievement across content and performance areas within mathematics also showed variability by gender, with boys, especially those in their final year of secondary school (Years 12 or 13), showing relative strength in problem solving. These complex patterns indicated that global theories of gender difference were unlikely to account for the complexity of outcomes.

With a few notable exceptions, there is a scarcity of New Zealand research explaining and addressing gender differences in mathematics. Consequently international research was relied upon in this chapter.

Of the attitudinal and affect variables posited to explain gender difference, the perception of mathematics as a male domain, and differences in mathematics self-efficacy or confidence, received the most support in the literature. These variables have been linked to the participation and achievement in mathematics of both girls and boys.

More recent theorising that criticises deficit theories of gender difference (which locate poorer mathematics achievement 'within girls') suggests that mathematics content, pedagogy and practice

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*an international scale, and promoting research aimed at examining educational problems in order to provide factual information which can help in the ultimate improvement of education systems. The Research Division of the Ministry of Education is the research organisation which facilitates New Zealand’s participation in appropriate IEA research projects and undertakes the project work. New Zealand has participated in a number of IEA studies since the early 1970s (eg, the Six-Subject Survey, 1970, the Reading Literacy Study, 1993, and TIMSS, 1992-1997 and ongoing).*
Explain and Addressing Gender Differences should be examined to explain how differences in confidence and mathematics outcomes are produced in mathematics learning and teaching. This literature suggests that mathematics as a subject needs to be inclusive of the experiences and knowledges of the learner.

A review of the mathematics assessment literature suggests that further New Zealand research is needed on the effects of assessment type (internal vs examination) on outcomes, and that assessment tools should be constructed with contexts that are relevant and familiar to the students being assessed.

We conclude by noting that while outcomes and indicators of performance, participation and attitude suggest where gender differences exist, they do not illuminate how such differences are produced. There is a need for classroom-based research within New Zealand to further investigate the conditions that give rise to the patterns of difference observed in the literature.

Chapter Six: Language and Languages Curriculum uncovers a history of assessment data revealing poorer male performance in English literacy over 100 years in Aotearoa New Zealand.

- Girls read more books, own more books and are more likely to belong to libraries. Boys and girls have gender specific preferences for their reading, girls preferring romances, mysteries and horror fiction and boys preferring to read about vehicles, sport and military matters.

- Boys constitute two-thirds of the students who participate in Reading Recovery programmes (designed for six-year-olds) and concerns have been expressed about the impact on these boys’ self-esteem of being positioned as failures at such a young age.

- Boys are found to do much more poorly than girls on information skills (within the IEA Reading Literacy Study) but the disparity decreases at the Year 8 level.

- The gender gap in reading literacy narrows somewhat through schooling, and although the lower literacy performance of males is a serious concern, New Zealand boys do achieve in reading literacy at a level far above the international mean. This contrasts with both girls' and boys' performance in mathematics and science in the TIMSS Study at the primary and lower secondary level.

- Research on boys' participation in literacy reveals that across countries, boys perceive literacy to be a feminine activity that is engaged in by 'wuss', 'girl', 'gay' type people, implicating homophobia as an influence on boys' behaviour.

- The major strategy used with both boys and girls in the literacy area has been the use of critical literacy informed by post-structural theory. Students, together with teachers, deconstruct the ways in which language and texts constitute male and female in opposition to one another.

- Links between literacy, science and mathematics are suggested as ways to deconstruct the gendered framing of literacy within the school curriculum.

- The IEA studies reveal teacher education to be a strongly significant factor in influencing student achievement.

- Students in countries with higher literacy levels have more women teachers.

- Gender differences persist across ethnic groups.

- Māori researchers provide a consideration of the sociocultural construction of language.
Chapter Seven: The Arts Curriculum brings to light the very little research available in the arts.

- The arts is a potentially fruitful area of development around issues of gender and education, as the curriculum provides a potential site for deconstructing gender and the body through visual representations and through dance. Within this chapter, possibilities for integrating arts and technology are discussed.

- Music is found, through assessments carried out under the National Education Monitoring Project (NEMP)\(^2\) umbrella, to be a subject that is stratifying girls’ higher performance and the lower performance of Māori, Pacific students and students from low decile schools. However, NEMP art assessments show the arts curriculum is not stratifying students to the same extent.

- International research indicates that boys see music and other arts disciplines as girls’ subjects. Comparable research in Aotearoa New Zealand indicates that boys from preschool to form 5 (Year 11) level also see arts as feminine, and that boys who do arts subjects may be bullied because of their association with femininity. This pattern may not hold across ethnic groups, particularly for Māori boys, and further research is needed to explain the complex relationships among gender, ethnicities and the arts.

Chapter Eight: Technology Curriculum considers research in technology education. Technology is a key curriculum area within this review, both because it is the focus of attention for its potential role in growing the knowledge economy and because it represents a structural intervention in previously markedly gendered curricula organisation.

- NEMP assessments reveal comparative performance in technology, although gender-based experiences influence differential areas of strength for boys and girls.

- Other research indicates that student stratification within technology may be linked to boys and children from wealthier families having greater access to computers at home. Gender differences in the enacted curriculum relate to boys’ dominance in computer access in class and to the integration of technology with “traditionally masculine” subjects like mathematics, rather than to technology integration across the curriculum.

- The absence of technology as a Bursary examination subject may contribute to the low number of technology students at university.

Chapter Nine examines the learning areas of Health and Physical Education. We note that an early equity concern related to the lesser participation of girls compared to boys in physical education, a concern more recently accompanied by a critique of the way physical education in schools positions boys and girls.

- Research drawing on post-structural theory explains how culturally authoritative definitions of body and masculinity and femininity are played out and perpetuated by the kinds of activities and learning environments characteristic of physical education classes.

- The valuing of conventionally masculine competitive and aggressive team sports over participation, and the skilling of students in a wide variety of activities in physical

\(^2\) The National Education Monitoring Project (NEMP) which commenced in 1993, is part of the Ministry of Education’s strategic work on national assessment. The project aims to get a broad picture of the achievement and other educational outcomes of representative samples of students in New Zealand schools at Years 4 (Standard 2) and 8 (Form 2). Different essential learning areas and skills, including attitudes and values, are assessed each year, over a four-year cycle.
education provide examples of how teaching and learning in this area can enforce a dichotomy of male/strong/skilled and female/weak/unskilled.

- Research straddling the disciplines of physical education and health argues that dominant versions/positions of masculinity and femininity have potentially negative outcomes for boys and girls.

- Macho forms of masculinity organised around values of physical prowess and stoicism narrowly define the body as a tool to prove masculinity. This definition sets the scene for boys to risk their bodies and health in order to demonstrate their masculinity.

- Narrow ideals of how feminine bodies should appear, and the construction of femininity as weaker and passive compared to masculinity, offer positions of femininity that see girls trying to live up to unrealistic ideals of body and experiencing their bodies as weak.

- Within the literature, the Health and Physical Education Curriculum is seen as a site for intervention in, and transformation of, these dominant definitions.

Research in the social studies curriculum discussed in Chapter Ten: Social Sciences Curriculum shows this curriculum area strongly stratifies students by gender, class and ethnicity. This finding signals the need for research and development in the social studies curriculum.

- Boys’ dominance in classroom interaction patterns has been shown to be greatest in social studies, above all other curriculum areas. However, research demonstrates teacher interventions to be effective in ameliorating these gendered patterns.

- Examinations of the intended and enacted curriculum indicate that social studies has been organised around the experiences of white men, with little attention to women or the experiences of men of other ethnicities. Further, the available positions for men in the curriculum have been found to be limited and constraining, for example, men as heroes, men as brave, and men as dead heroes.

- Teaching that incorporates the experiences of women through classroom visits integrated within the mainstream curriculum has been found to confound gendered expectations in ways that are effective for both girls and boys. Such strategies have also led to a greater valuing of women.

- Recent research has explored social constructionist approaches to including diverse learners in social studies, for example, Māori and Pacific students, and has drawn attention to the experiences of 'quiet boys' and 'quiet girls' in secondary school geography classes. Further research is required not only in the latter two areas but also to follow up Jones’ (1991) research on the nature of classroom interaction and its role in the cultural production of student achievement patterns.

Explaining Gendered Behaviour Patterns

In response to recent concerns about the behaviour of boys in schools, Chapter Eleven: Gendered Behaviour in Schools reviews some of the recent gender and masculinities research that addresses the production of masculinities and femininities in schools.

- Theoretically informed classroom- and schools-based research shows how culturally authoritative or dominant versions of masculinity constrain the educational, social and personal choices of boys and girls. ‘Dominant versions’ are defined by practices of compulsory heterosexuality, rejecting the feminine and femininity, and homophobia.
Rather than being seen as a neutral backdrop to the formation of masculine and feminine identities, the school is theorised as an active contributor to identity formation, along with other institutions such as the media, family and peer culture.

- Addressing narrow and constraining definitions of masculinity and femininity requires schools and teachers to examine curriculum content, organisation and pedagogy, school disciplinary and safety practices, and the kinds of activities and behaviours that are valued or discouraged in the school context.

- Equipping staff and students with the skills to critique dominant and constraining definitions of masculinity and femininity and find acceptable alternatives, along with examining the school and classroom practices already mentioned, emerge as key strategies for addressing oppressive and damaging gendered practices.

**Overview and Implications**

Finally, *Chapter Twelve: Synthesis and Implications* provides a synthesis of the literature, and the implications for the development of equitable teaching and learning in the school sector. These implications address issues such as the stratification of schooling, the status of the teaching profession, teacher education policies, and immediate curricular priorities, such as in mathematics, where overall student performance at the primary level in Aotearoa New Zealand is poor, compared to many other countries.
PART ONE:
CONTEXT AND APPROACH
CHAPTER ONE: INTRODUCTION

Our aims in reviewing the literature were twofold. First, we endeavoured to gain an understanding of the ways in which gender might be influencing differential learning and social outcomes for boys and girls, and for particular groups of boys and girls, in New Zealand schooling. Second, we interrogated the international and the New Zealand literature to identify effective educational policies, strategies and practices used to address gender issues and to optimise learning, well-being and social outcomes for both girls and boys.

In recent years, widespread local and international concern has been reported about the performance of boys in education (for example: Biddulph, 1995; Epstein, Elwood, Hey, & Maw, 1998; ERO, 1999; Hagan, 1999; Mac an Ghaill, 1994; McLean, 1997; Potter, 1999; Rathgen, 1998; & Town, 1998). In response to such concern, the New Zealand Ministry of Education carried out an initial review of gender patterns in student performance, drawing upon data held within the Ministry, covering, in the main, the period 1986 to 1997. The resultant report provided an overview of the participation and achievement of male and female students in English, mathematics and science (Praat, 1999). That report revealed contradictory and apparently equivocal findings, showing girls and boys variously to achieve more highly at different levels of the school and in different subject areas. An analysis of the report concluded:

‘While there are areas where particular concern for male students is warranted, for example, level of suspensions and their participation and achievement in English, the data ... suggest that any differences in the relative participation and performance of male students in the compulsory school sector are not new ... [and] both genders display particular areas of weakness.’

(Ministry of Education Request for Proposals, Literature Review Specifications, 1999, Appendix A, p.3)

In the light of these findings, the Ministry of Education commissioned this present review of recent literature on the range of factors contributing to gender differences in education, focusing on the compulsory school sector. This review is supplementary to the seven ‘state-of-the-art’ reviews that comprised the Ministry of Education’s Strategic Research Initiative commissioned earlier in 1999.

The request the Ministry sent out for a proposal from a contractor was a departure from the Ministry’s previous approach, because it required a contractor to work in collaboration with Dr Angelique Praat, a research analyst within the Ministry’s Research Division who had completed the initial overview report (Praat, 1999). The collaborative model has been a strength of the review process and is reflected in the use of ‘we’ throughout the text.

The endeavour has been supported also by the involvement of a National Advisory Committee. On advice from our National Advisory Committee, we have adopted a narrative style in order to make the review as accessible as possible. As well, we have supplemented the narrative with clear summaries in order to make policy implications clear, succinct and explicit. In what follows, we clarify the precise specifications for the review and then elaborate upon the implications of the policy specifications in the narrative.

The Ministry of Education’s specifications for the present review stated a particular interest in research at the primary school level. The specifications called for attention also to the learning and social outcomes of Māori and Pacific male and female students, and students at risk of not fulfilling their educational potential. The review specifications required answers to the following questions:
What are the key factors contributing to gender differences in learning, participation and social outcomes?

What strategies or policies have been used to address gender differences in learning, student participation and social outcomes?

How effective have these strategies/policies been and under what circumstances?

(Ministry of Education, 1998)

Contextually, the review focuses on the decade 1989 to 1999: the decade in which market policies, associated with the reforms under Tomorrow’s Schools, were implemented in New Zealand education. This period also coincides with the inaugural decade of the existence of the Ministry of Education.

Undeniably, societies at large construct and influence gendered meanings that permeate everyday life and deeply influence the participation and well-being of girls and boys, men and women. Although our focus on the school sector constrains the review accordingly, the research evidence indicates that because schools themselves can and do actively stratify and magnify gendered processes, such a focus is warranted. However, the review also signals the need for current research that theorises the ways in which our society constructs and polices gender in changing times.

In particular, there are substantial vacuums in our understandings of masculinities, femininities, cultures and identities in New Zealand. As we write this introduction and reflect upon the concerns about boys that instigated this review, the All Blacks, arguably the national icons of Kiwi heroic masculinity, have recently lost the rugby World Cup. The response of a depressed nation makes it very clear that such heroes should win and come first. Anything less is profound failure and unacceptable to this society.

There has recently been a general election in New Zealand. While the parliament is still predominantly peopled by male politicians, and statistics show New Zealand women earn far less on average than their male counterparts over a lifetime, the leaders of the two largest political parties are women. This means the disjunctions and interplays of gender and power in our society are increasingly more complex.

Throughout the review, we highlight the necessity to consider gender in context. The interplay of students’ gender, ethnicities, social class, sexualities and abilities variously influence their positionings, experiences, participation and achievements within the particular cultural practices of primary, intermediate and secondary schools. We have also emphasised the explanatory theories that have been used to explain and address gendered practices.

International research reveals gendered practices to be variously context specific, and it is theory rather than prescription that enables educators to make sense of, and respond to, gendered influences on particular students in particular contexts. Prescriptive responses can uncritically and unhelpfully frame girls as passive, victims, or advantaged ‘other’, and boys variously as heroes, bullies, victims or ‘disadvantaged’. Such thinking, and the politically correct prescriptions that can follow, fail to reflect the complexity and inter-relatedness of gender and power in education and society (or the agents of), and constraints upon students and teachers. Theory is the tool that enables critical thinking and creative and adaptive responses to changing times.

We are mindful in writing this review, that, in addition to its wider purposes for the Ministry of Education, the review was specifically commissioned by the Ministry’s Curriculum Division, to inform policies underpinning the development of resources for teaching and the provision of professional development for teachers. Accordingly, we have endeavoured to generate a literature review that will serve multiple purposes and audiences.
Our central purpose is to inform policies influencing the nature and provisions of professional development and teaching resources. Throughout almost every study we reviewed, the significance of the teacher and what the teacher understands is a given (Darling-Hammond, 1998). Unfortunately, the conditions that enable teachers to translate understandings about gender into effective and genuinely educational practice, frequently remain implicit within the research.

Frequently also, researchers conclude their consideration with the unhelpful and problematic imperative ‘Teachers should ...’. Such imperatives can deny the role of students themselves and the wider society in the co-construction of gendered processes, the complexity of gendered processes, the constraints within educational infrastructures, the knowledges available and accessible to teachers and the everyday conditions of teachers’ professional work.

Hence, we endeavour to make explicit the implications for teachers and teacher education. Over and above our central purpose to inform policy in this area, we hope that the review itself will provide a direct resource for teachers, principals, teacher educators and pre-service teachers.

At the directive of our Advisory Committee, we have given special attention to making transparent the role, potential, and value of research in informing policy and practice. This task has not been difficult. The review makes self-evident the significance of the research knowledges and the significance of the research silences, the value of research for both teachers and students, and the role of research in informing educational development and critical thinking within a field beset by myth and controversy.

While acknowledging the complexity of gendered issues, we have also attempted to identify implications arising out of the research. Our hope is that the implications raised will help provide a clear direction for holistic and informed policy development. To be effective, such policies should permeate educational infrastructures, processes, curricula, resources, and the reflective practices of teacher educators, educators, and students, and thereby to enhance the well-being and performance of both girls and boys.

The review is organised within four general sections: Context and Approach (Chapters 1–3), Gender and Curriculum (Chapters 4–10), Explaining Gendered Behaviour Patterns (Chapter 11), and Overview and Implications (Chapter 12). In the Context and Approach section we make transparent the specifications for the literature review, and provide an account of the methodology, which includes a consideration of what a ‘gender difference’ means. We have illustrated the need to consider the intersections of gender with ethnicity, social class, sexuality and culture.

In Chapter Two we have explained in depth the rationale for the structure of the literature review and our approach to using curriculum as an organising structure. We suggest that explicit attention to all the curricula areas is important because knowledge itself has been imbued with gendered associations through its organisation within disciplinary and curricula areas.

Chapter Three situates our review within a brief overview of the New Zealand educational context, the wider context of the labour market, and policies, infrastructures and resourcing constraints over the focus decade, 1989–1999. Within this chapter we consider the preliminary evidence about the effects of market choice policies on both girls and boys during this decade, and pose questions to be addressed within the larger review of research literature.

Also within Chapter Three, we provide an overview of various theories of gender difference, and the discourses at work in the historical development of gender policy — the tools of the gender debate. Our purpose is to enable the reader to draw upon and critique these theories and discourses and the strategies that have arisen from these ways of thinking about gender.
Finally, within the *Context and Approach* section, we consider the infrastructures that operate within New Zealand educational policy and practice to influence gender policy and the possibilities for development.

The central section of the report, *Gender and Curriculum*, provides a consideration of the research literature on gender and education within each of the seven essential learning areas of the *New Zealand Curriculum Framework* (Ministry of Education, 1993). We begin each chapter by establishing the gendered patterns of achievement and participation in each of the learning areas where this information is reported in the literature, and use these patterns as a platform from which to build a review of local and international research. Each of these chapters is tangible testimony to the available research in each learning area.

From the beginning to the middle of our focus decade, the education and gender research largely addressed the achievement and participation of girls. During this time, sophisticated explanations of gender and gender relations were developed to theorise girls’ disadvantage, and to assist girls to achieve their educational, social and economic promise. Boys were the silent but powerful partners in the gender dichotomy. Our reviews of the literature in the seven essential learning areas reflect this concern for girls and the relative silence about boys. However, by the end of the decade, masculinity, with its salient problems, came into focus as gender theorists developed the understanding that constructions of masculinity were critical to defining and constraining femininities and choices for both girls and boys.

Chapter Eleven provides an exploration of the masculinities and gender in education research literature and draws out the implications of this research for teaching practice.

In Chapter Twelve, we provide a synthesis of the issues arising from the literature reviewed. Implications derived from this synthesis are offered for research, policy and teaching practice.
Chapter Two: Methodology

‘The interpretive review of educational matters: Is there any other kind?’
(Schwandt, 1998, p.409)

‘As Signithia Fordham (1996) has pointed out, perceptions of entire generations, huge social groups, or neighbouring communities can be shaped, altered, and frozen by the writing and imagery of those who claim knowledge about them. Interpretivist–oriented reviews of educational research can serve a worthwhile purpose by capturing the insights that startle readers out of mainstream complacency about educational issues, suggest how and why various educational contexts and circumstances inform particular meanings, and reveal alternative ways of making sense out of educational phenomena. These reviews should be written to tell good stories with empathy for the various actors who grapple with educational issues and with respect for their circumstances and the progressive potential in their views and actions ... they would aim to expand, rather than settle, the possibilities for human understanding and educational practice.’
(Eisenhart, 1998, p.397)

As Schwandt (1998) so succinctly points out in the quotation above, one cannot do a review without interpretation. Such interpretation occurs in the review focus, the selection and inclusion of research, and the management of silences in the literature. Priorities are implicit, even through the space and consequent weight given to particular studies. Interpretation occurs in the framing of generalisations and specificities, the use made of both quantitative and qualitative studies, and the theoretical underpinnings informing the review. A review focused on gender has the added dimension that each of us — the reviewers, the advisory committee, and you, the readers — brings our own gendered identities and experiences to interpreting and synthesising the research.

Our response to these challenges in the nature of such a review is to make as transparent as possible our approaches, assumptions, rationales, and the processes that produced the review. In the Introduction we provided an account of the specifications set by the Ministry of Education. In this chapter, first we provide a brief description of how we proceeded and the mechanics of the process. Then we focus on seven major issues that influenced the methodology and our rationale for the approaches we adopted. These are:

- our approach to the use of New Zealand and international research;
- our approach to the constraints and breadth of the time period of the review;
- the decision to use curriculum as a category to structure the major part of the review;
- our provisional definitions of gender, our approach to ‘gender difference’, and the criteria we used to identify gender differences that matter for education;
- our use of comparative and contextualised analyses by gender, ethnicity, social class, disability and sexuality; and
- our approach to valuing and evaluating research and commentary on gender and, in particular, teacher research.
Finally, we make transparent what we see to be both the limitations of the review and the possibilities for subsequent development.

2.1 THE REVIEW PROCESS

2.1.1 Search Strategies

Our overall strategy was to use an iterative approach to searching, and to refining our searches as our review developed. An iterative approach was essential because historically New Zealand has not developed systematic databases in educational research generally, or education and gender in particular. Hence, we were unable to make reference to any comprehensive New Zealand databases or baseline reviews for the decade, 1989–1999.

We began by carrying out a comprehensive initial search using multiple descriptors and sub-descriptors to locate research and commentary by:

- school type;
- gender;
- ethnicity;
- diversity;
- school organisation;
- classroom variables;
- attitudes, self-concept and identity;
- pedagogy, teaching;
- learning and learning ‘styles’ and achievement;
- equity, advantage and disadvantage;
- programme, intervention, reform, action research;
- professional development and teacher education; and
- policy.

Thirteen distinct searches were carried out using the Ministry of Education library database, the National Library, ERIC [US], Australian, British and Canadian education indexes, INNZ, Austrom, NZBN, Dialog, and Uncover. The World Wide Web was also searched for very recent material and for information about new publications relevant to the review. The Ministry of Education library provided a substantial range of additional relevant texts and materials.

The iterative process led us to carry out subsequent searches for research by curriculum area and author. A search of individual university library catalogues was carried out to locate relevant theses. Requests were also sent to each university education faculty, department or school seeking lists of educational theses and research reports carried out over the 1989–1999 period.

A general letter was also sent to each New Zealand college of education, university education faculty, department or school, and to all polytechnics, explaining the scope of the review and seeking
information about any relevant staff or student research carried out during the period of the review or currently in progress.

As the review developed, members of the advisory committee provided further advice about relevant research and assisted in follow-up searches. In cases where little relevant literature was available, direct approaches for advice or assistance were made to leaders in the field.

2.2 EXPLORATORY PHASE

The initial eight searches produced 2,062 abstracts, which were retrieved and printed within three and a half weeks of the outset of the project. The wealth and extensiveness of the international material posed a genuine dilemma for us, as reviewers in the selection and organisation of the review content.

In order to generate a framework for the review that would do justice both to the review specifications and the material available, we set up independent databases with agreed categories for reviewing and classifying apparently relevant articles. The categories were:

- bibliographic information;
- key words to assist later database searches;
- a brief summary;
- key quotes; and
- a 1–5 ranking on a ‘usefulness for the review’ criterion, with a preliminary analysis of relevance to the review framework.

During the first two weeks we entered 39 texts, including books and research articles, into the databases. Also, we met frequently to discuss the patterns emerging out of this exploratory consideration, and to collaborate upon the construction of a draft framework for the review. The draft framework was then sent out to the Advisory Committee, who met on June 17, 1999 to critique, develop and clarify a proposed framework for the review.

Also, after consulting the Advisory Committee about the recently published Australian policy document ‘Gender Equity: A Framework for Australian Schools’ (Gender Equity Taskforce, 1997), we drew heavily upon this approach to guide the initial stages of our review. The revised framework for the review structure was accepted by the Ministry of Education after receipt of a progress report on 22 June.

2.3 REVIEW DEVELOPMENT

The key characteristics of the review agreed by the Advisory Committee were:

- an New Zealand focus;
- acknowledgement of diversity within gendered patterns;
- use of a diagrammatic overview of prevalent discourses within education and gender;
- use of Curriculum and Schools as organising categories;
- theoretical deconstruction of gender;
- attention to popular myths and explanations in the light of the literature;
• consideration of policy practice links;
• explicit attention to the role of research; and
• provision for an analysis of recommendations and priorities.

In addition to the first 39 entries, a further 78 articles and books were reviewed, and included in the database. However, this process proved too time consuming, given the number of relevant articles and the completion date for the review. As we became clearer about the structure and focus of the review, we entered our review material directly into the draft sub-sections of this document. The iterative search strategy continued and a range of additional searches were carried out to seek material relevant to each curricular area, and to follow up on questions emerging within the review.

We split the review into sub-sections as indicated in the Table of Contents, allocated sub-sections between us, and generated four initial draft sections. These drafts, with a series of focusing questions, were sent to the Advisory Committee in time for a second meeting held on 23 September 1999, during which the Committee members provided critique, support and helpful suggestions. Individual members of the Advisory Committee continued to correspond with us and to provide invaluable feedback and assistance with the development of the review. The collaborative process, which has been a strength of the approach throughout, intensified in the final two weeks as we endeavoured to inter-relate the sub-sections, provide overall coherence to the document, and make the findings as accessible as possible.

2.4 MECHANICS OF STYLE

As signalled in the Introduction, we have adopted a narrative approach to make the text accessible to educators, given our brief to inform teacher professional development. However, we have also used systematic summaries to ensure that the structure facilitates the generation of policy implications arising out of the review.

We have provided all references at the end of this report to enable readers easy access to the literature reviewed.

2.5 METHODOLOGICAL ISSUES

2.5.1 The Use of New Zealand and International Research: Issues of Generalisation and Relevance

As we generated the initial database in the exploratory phase of this review, it became increasingly apparent that gendered processes are context specific. Although there are near universal findings of patterns of gender bias in school texts and classroom interaction, the ways in which gendered processes influence, and are negotiated by, particular groups of students are specifically linked to cultural practices and cultural valuing of male and female. Such cultural practices include heteronormative constraints, homophobia, the interplay of social class structures, ethnicities and other characteristics of identity, such as rural/urban geographic locality and recency of family migration.

While studies of gender abound in different education systems and in different cultures, and may offer us important insights, there is no ready translation of these findings into New Zealand society. The deceptive appearance of the universality of the human categories of ‘boy’ and ‘girl’ can obscure the reality that gender identity intersects with nationality, social class, sexuality, ethnicity and culture. Accordingly, we need critically to evaluate the ways in which international research can be useful.

For example, Sewell’s (1998) article ‘Loose Canons: Exploding the myth of the ‘black macho’ lad’ may raise significant questions for New Zealand researchers and educators. Sewell demonstrated that
there were ‘fluid, multifarious, shifting and hybrid constructions of black masculinities’ (p.111) that operated in an inner-city boys’ comprehensive school in the Greater London area.

However, Sewell’s (1998) findings about the negotiation of masculinity, class, ethnicity and ‘hyper masculine heterosexuality’ are located within the complex intersections of African-Caribbean ethnicity and masculinity in an English school system. Such findings raise questions about the ways in which masculinity and ethnicity might be intersecting for Māori and Pacific boys in New Zealand, but can have no direct implications beyond the questions they raise for our own society and schooling.

Jones (1991) actively used international research as a counterpoint for her thinking in her New Zealand study of Pacific girls in a single-sex secondary school. Jones pointed out that the girls from working class families did not adopt a position of resistance against school, as was claimed for working class boys and girls in similar British research. Jones explained how she used the British research to inform her research in Auckland:

‘Like every other researcher in sociology of education at the time, I read Paul Willis’ study of white working-class boys at school in Britain, and Angela McRobbie’s and Margaret Fuller’s British studies of working class girls — and ... used them as points of contrast for my own work.’ (p.51)

Jones’ (1991) assertion that the international research provides points of contrast for local research that is grounded in the cultures and institutions of New Zealand schooling and society is a strong one. Jones’ (1992) later went on to critique her own cultural invisibility in the ethnography and her ‘othering’ of Pacific girls, arguing that research also should make transparent the cultural lenses, limitations and positionings of the researcher in reading or interpreting educational and cultural meanings.

The interpretation of context, culture and relevance is not only a challenge for the ways in which we use international research, but also for the ways in which cultural positionings might constrain and shape the researcher’s reading of what is researched in New Zealand.

Implications of our Approach

In this review, we focus on the New Zealand research because such research provides insights about gender and schooling within our own society. Such research is generally offered as provisional knowledge that should be interpreted in context. As even the New Zealand research increasingly reveals that the intersections of ethnicity, sexuality, social class, dis/ability might be context specific, we emphasise the geographic and cultural context to enable the reader to reflect critically on possible relevance.

While we offer the overseas research we have reviewed cautiously, we have also extensively drawn on that research in the review for the following purposes:

- as points of contrast to clarify the nature and difference of New Zealand cultural processes;
- as sources of significant questions for the New Zealand context;
- for methodological insights;
- for theoretical insights; and
- as a source of information about gendered processes that persist beyond ethnic and social class differences, and across national boundaries.
The international research has also been invaluable because many studies reflect levels of research funding and resourcing that are not feasible in this country — for example, the Australian gender equity initiatives. Also, the international research provides invaluable leads about projects that have been successful and may suggest directions for similar New Zealand initiatives. However, we do endeavour to provide contextualising information about the overseas research, and to avoid the authoritative voice of global neutrality that can present such information as a universal and misleading ‘truth’.

2.5.2 The Review Time Period (1989–1999)

Although we have focused on research reported during the decade of study, we have drawn upon landmark studies and reviews that preceded the decade of study to provide points of reference for our review. Also, in curricular areas such as arts, where extant research obtained through our search strategy was meagre, we have expanded the timeframe. In these cases we have endeavoured to frame the information as historical.

We are mindful that marked policy changes have occurred within the decade of study. The implications of these policy changes are addressed within Chapter 3 and within the Implications (Chapter 12).

2.5.3 The Curriculum Structure Used for the Review: Its Strengths and Shortcomings

Arguably the most significant decision made in framing the review was to use curriculum as a key organising category for our consideration of the research on students’ participation in, experiences of, and achievement during schooling.

Initially, the Praat (1999) report clearly illustrated the differential weaknesses of girls and boys by subject area. During our exploratory phase, it also became clear that the gendered dimensions of school subjects provided an important dimension of context that needed to be made explicit. As will be made evident in the reviews for Chapters Four, Five, Six and Seven, mathematics and science have been positioned as “traditionally masculine” while the arts and English have been positioned as “traditionally feminine” areas within the school curriculum.

Lack of attention to the comparative contexts of and differential gender patterns across different curricular areas lead to inappropriately generalised explanatory arguments. For example, the attribution of primary level boys’ poorer performance on literacy tests to relatively simple explanations linked to teacher gender was problematic, when the same women teachers were teaching boys’ social studies in which they appeared to achieve more highly than girls. By differentiating curriculum areas within the review, we have been able to make the context of gendered knowledge traditions explicit and open to critical consideration.

We have used the broad curriculum categories from the national curriculum framework, rather than separate subject areas, to facilitate scrutiny of any emerging evidence of the impact of the national curriculum policies. This approach is intended also to facilitate the development of policy recommendations linked to resourcing structures. Currently, the Ministry of Education’s funding regimes for in-service professional development are frequently linked to curriculum-based initiatives.

The weakness in this approach is that the breadth and scope of the curriculum is such that we have not been able to address each curricular area sufficiently adequately or comprehensively. The historical lack of previous or existing research databases for general research on learning and teaching across the curriculum has been an impediment to our purpose here.
Accordingly, our methodological approach has been to review sufficient research to raise and consider key issues; to make transparent the shortcomings of the review coverage for that area; and to identify emerging areas of insufficient research knowledge.

While our approach has its shortcomings, our exploratory consideration of the extant research revealed that the alternative approach, wherein reviewers consider gender issues irrespective of curriculum context, would be more problematic and confusing for coherent policy development.

2.5.4 Gender and the Significance of Gender Differences

Gender

Gender is not a neutral concept. Definitions of gender imply a set of assumptions or theories of what it means to be masculine and feminine, male and female. For the purposes of this review we use gender to refer to the social construction of female and male identity. Gender is:

‘... more than biological differences between men and women. It includes the way those differences, whether real or perceived, have been valued, used and relied upon to classify women and men, and to assign roles and expectations to them.’

(Ministry of Women’s Affairs, 1996, p.7)

This definition acknowledges that there are biological differences between males and females, but signals the greater interest and importance of the social influences and processes that prescribe ways of being masculine and feminine — the kinds of meanings, understandings and differences we ascribe to being male or female. This definition provides the best explanation of the diverse, uneven and apparently contradictory gendered patterns in the body of research we reviewed both within and across curricular areas.

An emphasis on the social derivation, production and construction of differences helps us to make sense of the diversity of experiences and outcomes of men and women, boys and girls, across time, and between and within cultures (for example, see the differences in achievement outcomes and participation outlined above). It also draws attention to the way in which differences have been differently valued.

A focus on the social production of gender opens up opportunities for change and intervention, examining the way in which current institutions including the school, contribute to gendered differences. Such a focus is consistent with current policy frameworks (for example, the Ministry of Women’s Affairs, 1996). This focus on the social production of gender also reflects current theorising in the gender and schooling area in countries where there has been significant research and policy development in this field addressing the needs of both girls and boys (for example, see Gender Equity: A Framework for Australian Schools, Gender Equity Taskforce, 1997).

What are Gender Differences? What Gender Differences Matter for Education? What do Mean (Average) Gender Differences Signify?

The traditional approach to identifying gender differences in education has been to compare the achievement scores, or data for some other variable of interest, for two random populations of students, categorised by female and male gender into groups. When average differences are identified between the two groups’ scores and are found not to be attributable to chance, then such differences are called statistically significant and are presumed to be linked to the gender difference.

However, questions about what particular gendered influence or complex mix of gendered influences are causing the difference are not readily answered and indeed, are the subject of this whole review. Even when there are statistically significant gender differences between groups of girls and boys on
some measure, there is generally far greater overlap in performance between the two groups than difference. Further, the range of performance within gender groups generally reveals far more variability within each gender group than variability between the groups. Figures 2.1 and 2.2 below illustrate the commonality between the genders on performance in School Certificate English and mathematics.

FIGURE 2.1 PERCENTAGE DISTRIBUTION OF SCHOOL CERTIFICATE ENGLISH GRADES

FIGURE 2.2 PERCENTAGE DISTRIBUTION OF SCHOOL CERTIFICATE MATHEMATICS GRADES

The larger the difference between the average (mean) scores for females and the average scores for males on such comparisons, the greater ‘the gender gap’ is said to be. The size of the gender gap is sometimes used as the sole criterion of concern in discourses of equity.

There are dangers in using the magnitude of a ‘gender gap’ alone as an index for an educational interpretation of seriousness of concern or priority. Recent attention to gender and education in the media has focused on gender gaps as a kind of absolute measure of what matters. For example, when the ERO (1999) report ‘The Achievement of Boys’ was released, national television news reported that now it is not social class but gender that matters in the gender gap shown between boys and girls. The focus of the comparison was the lower number of B grades or higher in School Certificate attained by boys. A consideration of the ERO (1999) report shows that there was an 8.34 percent gender gap favouring girls between girls’ and boys’ School Certificate grades of B or higher in Decile 10 schools, and a gender gap of 2.04 percent favouring boys. But it further shows that for students from Decile 1 schools, there was an almost 40 percent gap (favouring higher decile schools) between the proportion of students from Decile 1 schools who gained B grades or higher in School Certificate and the proportion of students from Decile 10 schools who gained these grades (see ERO, 1999, p.44: Table ‘Percentage at B or better by Decile’). Clearly the gender differences, although significant indicators of concern about gendered effects, are still a great deal less significant in influencing New Zealand students’ life chances than the social class mix in low decile schools. In our consideration of gender in context in the next methodological issue discussed, we have argued the case for contextualising the magnitude of gender difference within comparative data of other measures of difference in outcomes.

Because there is so much overlap between girls and boys in many educational outcomes, it is important, when reviewing the field, to identify which groups of girls and boys are experiencing difficulty and why. We have argued also that gender gaps need to be contextualised in the light of overall student participation and performance in a curriculum area. For example, as is shown in Table...
2.1 below, the greatest gender gap apparent in primary students’ performance in reading literacy, mathematics, and science is clearly in reading literacy.

However, when we move away from the notion of gender gap as an absolute comparison and identify the performance of New Zealand girls and boys against international comparisons (according to the IEA studies), then further significant educational questions arise.

For example, it is clearly a concern that there is a statistically significant difference between girls and boys in reading literacy, but while New Zealand boys, on average, are far surpassing international means in reading literacy, both New Zealand girls and New Zealand boys are doing more poorly than the international mean performance in mathematics (c.f. TIMSS). However, in mathematics at the primary school level, there is no statistically significant gender difference in New Zealand students’ very poor performance, on average, by international standards.

The question we then need to ask is ‘Which girls and which boys are achieving poorly?’ Our view is that in order to answer this question adequately, there needs to be readily accessible data on New Zealand student performance which reveal significant differential outcomes against international standards; and particularly standards showing clearly how groups of girls and groups of boys are doing on average by ethnicity, social class, and any other variables of identity or group membership.

Such data have not been generally historically available, because publications reporting the TIMSS and other IEA studies tend to use different scales for international comparisons of overall performance and gender performance than those used in national comparisons of student performance by gender (eg, Wagemaker). We are indebted to the Ministry of Education’s Research Division for providing international comparative studies information from its databases that enables students’ performance in literacy, mathematics and science to be compared for sub-groups of girls and boys by ethnicity (see Table 2.1).

What is particularly evident in these comparisons is that New Zealand’s Pacific students are performing far less well by international standards than either boys or girls as an overall category.

Because of the marked variability between ethnic groups on these international tests and because of the patterns of intersection between gender and ethnicity in the results, we have used this comparative approach, and (where possible) international standards, as a benchmark within our review. Given the disparate patterns revealed in it by such comparative data, we recommend that this data be readily accessible to inform wider policy decisions.

While we have made a case to give less weight to gender and gender differences in the context of other important dimensions of identity, we wish also to make the case for giving more weight to gender.

The gendered construction of the social world has historically been so culturally pervasive, albeit in different forms, that work, leisure, language, knowledge and representation in our societies have been deeply gendered. Even colours and shapes carry gendered associations. For each of us, irrespective of our ethnicity, social class, work, geographic location, disabilities, and sexuality, our gender is an essential part of our identity within the cultural practices that frame our everyday lives.

Our gender deeply influences the ways we experience, negotiate and participate in social life. For the children and teachers in our society, negotiating gender identity and the gendered influences on educational practices is a task that inescapably shapes the constraints upon and possibilities within our lives. Accordingly, while we attempt in this review to contextualize gender and critically to evaluate the magnitude and implications of ‘difference’, we attempt also to reflect the qualitative impact of gender on education and student identity.
TABLE 2.1  NEW ZEALAND YEAR 5 STUDENTS; MEAN (AVERAGE) PERFORMANCE BY GENDER AND ETHNICITY IN THE IEA THIRD INTERNATIONAL MATHEMATICS AND SCIENCE AND READING LITERACY STUDIES
2.5.5 Gender in Context: Gender, Ethnicity, Social Class, Sexuality, Dis/ability and Other Dimensions of Cultural Identity

Throughout this *Methodology* chapter we have addressed the centrality of the intersections of gender and other dimensions of human social and cultural identity in explaining differences in education. Frequently, the New Zealand research indicates that gender is the least influential variable in the magnitude of differences in educational participation and outcomes for different sub-groups. Accordingly, we attempt to use available data, and in particular, the National Education Monitoring Project (NEMP) (Crooks et al; Flockton et al) findings to place our discussions of gender and curriculum within a contextualised consideration of social class and ethnic differences.

Where relevant research has been available, we have given special emphasis to the consideration of Māori and Pacific students in this process. Where there is insufficient research to answer questions, we have signalled our view about the necessity for such research and development.

There is clearly the need for research that both aggregates and disaggregates findings for cultural and ethnic sub-groups. In the light of extant findings, there is a need for research that aggregates Pacific students by ethnicity, rather than school membership, as in the National Education Monitoring Project to date. There is also a need for research that disaggregates data for Pacific students by particular ethnicity — Samoan, Tongan, Cook Islands Māori, Niuean, Rarotongan, Tokelauan, Fijian and other Pacific groups and sub-groups — and further differentiates these groups by other critical variables such as recency of family immigration. Our review suffers from the absence of such research in education in New Zealand.

In using this approach to comparative contextualisation of gender, ethnic, and social class differences, we are aware that we may be providing data that unfortunately slips into the deficit perspectives endemic in New Zealand educational thinking. One example of this perspective is the deficit attributions made by schools and reported in the ERO (1995) analyses of the barriers to student learning identified by 272 New Zealand schools. The substance of the review provides much evidence that the performance of different ethnic and social groups reflects an interaction between schooling structures, processes, language and cultures, and student identity. We trust that a thorough consideration of the review evidence will challenge the deficit perspectives that have become endemic in New Zealand education, and raise questions about the reasons for the perpetuation of deficit attributions.

The work by Mac an Ghaill (1994) in Britain, Sears (1998) in the United States, Quinlivan (forthcoming), Quinlivan and Town (1999) and Town (1998) in New Zealand makes painfully apparent the cost to students of the regimes of heteronormativity and homophobia that render open gay identity the target of extreme verbal and physical abuse and social ostracism. The growing body of work in this field makes it evident that a major educational strategy historically has been denial of the existence of gayness in humanity and, in particular, in students.

Other strategies have been the positioning of gayness as sick, evil or intrinsically paedophilic. The difficulty for our review is that such consequences of open gayness constrain the availability of existing work on the intersections of gender and sexuality.

This absence is a particular concern for a review on gender because the research that does exist increasingly signals the significance of regimes of heteronormativity in shaping gendered practices. Mac an Ghaill (1994) noted that he was surprised to uncover the extent to which heteronormativity polices boys’ behaviour generally, their management of macho masculinity and their treatment of girls. In fact, Mac an Ghaill found the influence of heteronormativity to be so substantial that he was constrained to make fundamental changes in his research design and focus.
There is very little accessible information about what is happening to lesbian students in schools. While we have been limited in the material available for the review that explains such processes in the New Zealand context, we have attempted to use sufficient evidence to signal the need for significant further work in this field. Our purpose has not just been to explain implications for gay students, but also to explain this major influence on gendered regimes which influence all students in New Zealand education.

2.5.6 Valuing and Evaluating Research and Commentary on Gender

Different kinds of educational research can inform educational policy and practice in different ways. While large scale quantitative studies can provide invaluable data that describes what is, smaller scale studies are generally necessary to generate explanations of sociocultural processes. Nash assisted by Major (1997) explained the ‘social arithmetic’ tradition in sociological research:

‘The methodology itself was indispensable because large scale surveys could provide the necessary information to monitor the social performance of the educational system. However, the processes that generated the inequality/difference they revealed, being unproblematic, rendered the entire approach vulnerable to critique. The under-specified theory ... despite its concern with ‘wastage of talent’ and genuine commitment to social equality, seemed indifferent to the mechanisms of exclusion operating within the structures of knowledge, and its transmission provoked in consequence marked dissatisfaction. ... A successful explanation will rest on an adequate theory of the real and concrete mechanisms by which the many-faceted and complex processes involved in the generation of equality/difference are created.’ (pp.9–10)

Nash assisted by Major (1997) went on to explain his conclusion that the theoretically imbued in-depth study of four individuals provided the best approach to explaining social inequality. Because the review specifications required a focus on explaining gender differences, we have valued the particular insights of research that has been theoretically informed and informing.

Our approach in reviewing the research available has not been to give privilege to particular kinds of research traditions or methodological approaches to the exclusion of others. Rather, we have attempted cautiously to ascertain what a particular piece of research can and cannot tell us about gendered patterns and processes in education. As explained previously, we present the findings as provisional, and inextricably linked to the socio-cultural, temporal and geographic contexts in which the research was conducted.

We have taken on board, also, Eisenhart’s (1998) directive that:

‘... reviews should be written to tell good stories with empathy for the various actors who grapple with educational issues, and with respect for their circumstances and the progressive potential in their views and actions’ (p.397).

Too often, teacher-research has been regarded as less prestigious than that produced by other researchers, because of its small scale and its methodologies constrained by the exigencies of the teacher’s concurrent practice. Yet it is only the small scale, situated research that can explain what might be occurring for particular students in a particular setting at a particular time, in such a way that a teacher could be genuinely responsive to those girls and those boys. Further, the teacher-research movement itself has been one of the most effective and critically reflective strategies for ensuring that educational practice meets the needs of girls and boys.
The commentaries and syntheses published by educators in professional journals have also been given particular weight in this review, because they perform the invaluable function of linking educational practice to policy regimes through the eyes of those working with students.

Our perspective on the various kinds of research, and the diverse epistemologies of the knowledges we have reviewed, is that they all can contribute to a more comprehensive perspective when considered thoughtfully within the context of an overall review.

2.5.7 Reviewing Gender: A Continuing Iterative Process

It is an unenviable task providing the first attempt at a comprehensive national review in a field as broad in scope as that of gender and education. Such an attempt, is likely to elicit a response from many who have knowledge of relevant research that should have been included but was not captured by our search strategies. Our hope is that such responses will enable the iterative process to continue, through systematic updating and improvement of this initial attempt, both to improve the review and to provide the necessary updates. Updating will ensure that our changing times are reflected in changing gendered influences on New Zealand girls, boys, and schools.
Chapter Three: Gender Policy In Context

‘Have the All Blacks gone girl on us?’

Our review of the research literature on gender differences in schooling in New Zealand has been located in the last decade of what is now a past millennium. Gendered binaries such as those exemplified in the quote above — male/(not) female; loser/(not) winner; strong/(not) weak — have influenced and even structured our thinking about identity. The question “Have the All Blacks gone girl on us?” humiliates men (winners/strong/successful) by suggesting their failure to win the rugby World Cup puts them at risk of being positioned as girls (losers/weak/failures).

The writer’s use of ‘girl’ to insult men reflects one of the deepest ‘insults’ still prevalent in the school playground (Norris, 1999). The usage makes transparent the derogation of female that lies beneath the surface of New Zealand culture. The positionings of male and female implicit in the question have been evident in much of the media discussion surrounding the All Black’s ‘failure’ of coming fourth in the World Cup contest. What does it mean for young men to grow up in a culture that is so intolerant of men ‘losing’? What does it mean for young women to know that, in itself, their gender constitutes an insult to their brothers and male peers? Such binaries have influenced the ways in which individuals understand and negotiate their identities, ways of being in the world, health and well-being, relations to others, and the gendered power regimes of our schools and wider societies.

However, within popular culture and our communities, gendered categories have increasingly become disrupted and unsettled in public discourses over the past decade. Not only have males taken up positions traditionally framed as belonging to the female domain, and females taken up positions traditionally framed as belonging to the male domain, but it has also become increasingly evident that gendered identities within individuals can be more complex than binary thinking allows. A notable marketing campaign for Doc Martin shoes in the mid-90s asked ‘Are you a girl or a boy?’ And the answer was ‘Yes’. Technically, this is an accurate answer to the question; but the reaction to this marketing campaign may be an example of the rejection of gender as a binary concept in the popular culture. A respected public figure in New Zealand, Georgina Beyer, the Mayor of Carterton, coinciding with her standing for Parliament, recently published her biography tracing her transition from male to female in our society.

How do the gendered regimes of a society in which media can confidently ask the question ‘Have the All Blacks gone girl on us?’ influence the well-being of young people in New Zealand? How do we understand and frame femininity and masculinity, and success and failure as a society?

There is clearly a need for substantial research tracing the links between the gendered regimes of the wider society and those that work in our schools. While such research is needed to explain the subtleties of those influences, what we do know is that all is not well for our children and young people in finding and forming their identities and place in New Zealand society.

As is discussed in Chapter Nine, New Zealand has the highest rate of reported youth suicide amongst OECD countries. Males are three to four times more likely to succeed in suicide and females are more likely to attempt suicide. Māori males and females are more likely to complete suicide than non-Māori. In the context of this review, it is deeply concerning that the highest rate of attempted suicide occurs within the age group of our nation’s 13 to 19 year olds.

1 Deidre Macken, Mt Cook, Wellington, Letters to the Editor, Evening Post November 10, 1999.
Gender patterns in well-being, participation and achievement are considered throughout the body of this review and in-depth in Chapter Nine. In the current chapter, we provide an initial overview of the implications for a consideration of gender and schooling, of the contexts, policies, resources and infrastructures within which New Zealand educational practice has been situated in the past decade, and ‘the knowledge economy’ within which education is foreshadowed to play a key role for the future. Specifically, this overview includes a consideration of the following for the New Zealand educational context:

- Gender patterns in the labour market;
- The knowledge economy;
- Contextual information about expenditure, teachers, schools and students;
- Theories of gender difference;
- Current gender policies;
- An historical overview of gender policies and discourses; and
- Infrastructures.

Our rationale for this approach is as follows. We focus not only on the differential gender patterns in labour market participation and remuneration but also on the pace of change in the narrowing of gender gaps between males and females in New Zealand during the decade of focus. These inequities and changing patterns contribute to the nature and contestation of gendered practices in New Zealand society and schooling. Also, these patterns reveal the links between participation and achievement in schooling by gender and by later remuneration in the workforce.

By situating our consideration of policy within a national and an international context we intend to provide a tool for readers to assist in interpreting both the New Zealand and international research literature in context. To achieve this end we draw upon the OECD Indicators (Centre for Educational Research and Innovation, 1998a) and the OECD Education Policy Analysis 1998 Indicators (Centre for Educational Research and Innovation, 1998b).

The brief historical overview of gender policies and discourses in New Zealand over the past 60 years enables us to trace how such policies and discourses have shaped educational practice. Because current educational responses to gender differences and issues have grown out of these discourses and draw upon the tools of these discourses, such an overview provides a useful framework for interpreting the research literature and identifying future possibilities for development. Also, the historical overview enables a consideration of the extent to which, and the ways in which, such discourses variously attend to girls and/or boys.

Given that the purpose of the review is to derive from the literature insights into how gender differences might be addressed in compulsory schooling in the New Zealand context, we consider the current constraints upon, and possibilities for accomplishing change.
3.1 CHANGING GENDER PATTERNS IN EDUCATIONAL QUALIFICATIONS, LABOUR MARKET PARTICIPATION AND INCOME

3.1.1 Gender Patterns in Paid Employment

There have been both marked patterns of gender difference and rapid change evident in labour market participation in the decades leading up to and including our focus decade. In 1951, New Zealand females constituted 23 percent of the paid labour force. By 1996, the statistic had doubled and females constituted almost half (46%) of the paid labour force in New Zealand (Department of Statistics, 1996 New Census of Population and Dwellings; Sturrock, 1993). This change predominantly occurred prior to the focus decade, with a marked change in women’s participation in the paid labour force occurring between 1961 (25%) and 1991 (44%). However, the 1996 statistics revealed that males predominated in full-time paid work (57.7% compared to 33.3% of females) whilst females were engaged in part-time paid work at more than twice the rate of males (18.5% compared to 8.3%) (Department of Statistics, 1996 New Census of Population and Dwellings; Sturrock, 1993).

As is apparent in Table 3.1, the employment patterns for females and males in New Zealand are markedly different. This result has implications for the different gender patterns evident in student participation in the various curriculum areas discussed throughout the body of this review.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
<td>Total</td>
<td>Female</td>
</tr>
<tr>
<td>Professional/ Technical</td>
<td>16.2</td>
<td>7.1</td>
<td>9.4</td>
<td>17.9</td>
</tr>
<tr>
<td>Administrative/ Managerial</td>
<td>1.9</td>
<td>7</td>
<td>5.6</td>
<td>2.1</td>
</tr>
<tr>
<td>Clerical</td>
<td>28.4</td>
<td>7.6</td>
<td>12.8</td>
<td>31</td>
</tr>
<tr>
<td>Sales/Service Workers</td>
<td>28.2</td>
<td>9.9</td>
<td>14.6</td>
<td>27.2</td>
</tr>
<tr>
<td>Agriculture</td>
<td>4.1</td>
<td>18</td>
<td>14.5</td>
<td>7.5</td>
</tr>
<tr>
<td>Other</td>
<td>20.6</td>
<td>48.7</td>
<td>41.7</td>
<td>12.5</td>
</tr>
<tr>
<td>Unspecified</td>
<td>0.5</td>
<td>1.7</td>
<td>1.4</td>
<td>0.7</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
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</tbody>
</table>


3.1.2 Gender Patterns in Unemployment

Whereas New Zealand females were more likely to be unemployed before the focus decade (1989–1999), male unemployment has been slightly higher than female unemployment during the 1990s. For example, in 1991 the proportion of females aged 15 years and over who were unemployed was 5.5 percent, compared to 7.2 percent for males. By 1996, however, this gap had lessened, so that unemployment for females (4.7%) and males (5.1%) had become more comparable. Across age groups, unemployment is most marked among school leavers and those in their early 20s.

The 1996 census data reveals that New Zealand females aged 15 years and over were far more likely not to be in the paid labour force than males (40.9% of females and 25.6% of males). This pattern, reflecting in part the traditional female role of unpaid labour in the home, has also been changing over the past decade. As can be seen in Table 3.1.2 there has been a slight increase in the percentage of males who are not in the paid labour force (22.5% in 1986 to 25.6% in 1996). However, there has been
a larger decrease in the percentage of women who are classified as not being in the labour force in the New Zealand Census (46.7% in 1986 to 40.9% in 1996).

**TABLE 3.1.2 LABOUR FORCE STATUS BY GENDER FOR THE USUALLY RESIDENT POPULATION, AGED 15 YEARS AND OVER, 1986, 1991, 1996**

<table>
<thead>
<tr>
<th>LABOUR FORCE STATUS</th>
<th>1986</th>
<th>1991</th>
<th>1996</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Full-Time Employed</td>
<td>34.7</td>
<td>69.5</td>
<td>31.4</td>
</tr>
<tr>
<td>Part-Time Employed</td>
<td>13.7</td>
<td>4.0</td>
<td>14.2</td>
</tr>
<tr>
<td>Total Employed</td>
<td>48.4</td>
<td>73.6</td>
<td>45.6</td>
</tr>
<tr>
<td>Unemployed</td>
<td>4.8</td>
<td>5.5</td>
<td>4.7</td>
</tr>
<tr>
<td>Not In The Labour Force</td>
<td>46.7</td>
<td>22.5</td>
<td>48.9</td>
</tr>
<tr>
<td>Not Specified</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Source: Department of Statistics, "1996 New Zealand Census of Population and Dwellings — Employment and Unemployment".*

3.1.3 Gender Patterns in Level of Educational Qualifications

More working age males than females had undergraduate or postgraduate university qualifications (12.8%, compared to 10.4%). As well, working age males more often held other tertiary qualifications than their female counterparts (32.2%, compared to 20.8%). Over the decade of study, the gender gaps have narrowed markedly, but males are still achieving higher qualifications, more frequently than females. In 1988 the relative proportion of women/men with Bachelors degrees or postgraduate qualifications was only 57 percent but by 1998 the relative proportion was over 80 percent. The proportion of women gaining such higher qualifications more than doubled over the decade to achieve this level of greater comparability between males and females. Similarly, at the outset of the decade the proportion of women who gained other tertiary qualifications was only half that for men, but over the decade of study this proportion increased to two-thirds. What is also strongly evident is that, as the gender gap narrowed, higher proportions of both men and women attained higher qualifications.

Delamont (1999) claimed that there has been substantial misinformation about the rising achievements of both sexes:

*The moral panic about boys’ under-performance is based on a lack of understanding of the rising achievements of both sexes, and the resistance of commentators to hearing good news.* (p.9)

3.1.4 Gender Patterns in Remuneration within the Labour Force

Men continue to earn more than women in New Zealand society, with a ratio of 171 for men to 148 for women on the scale used in the OECD Indicators 1998 (p.32). But the gender gap in average earnings has narrowed over the last two decades. In 1981, men earned on average approximately two-thirds more than women; but the gender gap in average earnings closed substantially for the five-year period between 1981 and 1986, when men earned one-third more than women (Sturrock, 1993).
An analysis comparing 1986 data (Sturrock, 1993) to the 1998 OECD statistics (assuming 1996 figures) reveals the gender gap to have closed further over the decade 1986 to 1996, with New Zealand men earning on average just over one sixth more than women. This trend is shown in Figure 3.1 above.

Because the data on male/female ratios have been obtained from different sources to show the trend, for the purposes of the comparison by ratios, female remuneration has been represented as a constant. A particularly marked change in the differential income of the genders took place in the 1980s. However, the gap continued to narrow until 1996.

3.2 THE KNOWLEDGE ECONOMY

‘Knowledge has become perhaps the most important factor determining the standard of living — today’s most technologically advanced economies are truly knowledge based.’

(World Bank, cited in Bright Future, 1999, p.12)

In 1999, the New Zealand government announced a new national policy for a society based on a ‘Knowledge Economy’. The New Zealand policy for a knowledge economy follows such initiatives internationally. For example, the OECD Report, Education Policy Analysis 1998, begins:

‘National economies are restructuring themselves in ways that react to technological, social and economic change, and at best to take advantage of them. A universal objective has been to give greater weight to the skills, knowledges and dispositions embodied within individuals.’

(Centre for Educational Research and Innovation, 1998b, p.5)

Underpinning this new policy direction is a shift in thinking about the place of knowledge and education in the economic system, and the role of education in the production of wealth within society. A fundamental question for this review is: will this new direction will influence gendered patterns in educational, social and economic stratification?

The new policy direction is influencing different groups in the wider society to take a fresh look at our resourcing of education, our participation in education, and the nature, function and effectiveness of schooling. Within a knowledge economy framework, education is positioned as an engine for the economy, and creator of prosperity. In ‘The Knowledge Economy’, a submission to the New Zealand
Government by the Minister for Information Technology’s Information Technology Advisory Group (1999), education was identified as the first of the six key issues for New Zealand to address in fostering the growth of the knowledge economy. This Advisory Group pointed out that ‘educational attainment and public spending on education are correlated positively to economic growth (Barro & Sala-I-Matin, 1995; Benhabib & Spiegel, 1994; Ministry of Commerce, 1999, p.19).

3.3 EXPENDITURE

One of the most significant constraints on an education system is the level and distribution of funding available. Table 3.3 reveals an international comparison of the patterns of educational expenditure per student in New Zealand in the primary, secondary and tertiary education sectors.

<table>
<thead>
<tr>
<th>TABLE 3.2 FINANCIAL AND HUMAN RESOURCES INVESTED IN EDUCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level of Education</strong></td>
</tr>
<tr>
<td>primary</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>NZ Expenditure</td>
</tr>
<tr>
<td>OECD Mean</td>
</tr>
</tbody>
</table>


While New Zealand data were not provided for the OECD Indicators 1998 analyses of changes in expenditure over the past decade, a comparison of expenditure per student at the primary level shows a relative drop in expenditure between the OECD Indicators 1997 and the OECD Indicators 1998. This comparison reflects a drop over the 1994 to 1996 period.

During this period, the OECD Indicators show that New Zealanders, including tertiary students themselves, invested more than the international mean per student at the tertiary level. However, the investment was less at secondary level and markedly less at the primary level. This pattern of expenditure is reflected in the higher mean ratio of students to teaching staff in New Zealand compared with the international mean. In New Zealand, the ratio at the primary level is 1:22, compared to the OECD mean of 1:18.3, and, at the secondary level it is 1:16.1, compared to the OECD mean of 14.6.

3.4 TEACHERS

‘School quality measured, for example, by teacher pay, student teacher ratio and teacher education is positively correlated to the future earnings of students (Card and Krueger, 1992).’

(Ministry of Commerce, 1999, p.19)

Recent debates on gender and boys have focused on the roles of male and female teachers in New Zealand (Roger, 1999). New Zealand has a slightly higher proportion (79%) of women teachers in the primary service than the OECD mean (75%). The proportion of female teachers is also higher in the secondary service, which in New Zealand is 55 percent, compared with the 50/50 division of male and female secondary teachers shown by the OECD Indicators 1998 means. As for most OECD countries, the average age of primary and secondary teachers in New Zealand is over 40 years.

Farquhar (1997) argues that the absence of male teachers in early childhood and primary education has serious costs. He further argues that pay levels influence males’ reluctance to enter the profession, as do prevalent discourses that inappropriately penalise men as a whole for the sexual abuse behaviours of individuals. She points out that the evidence does not suggest that the work performance of male
teachers is better than female teachers. Rather, that the presence of male teachers breaks down
gendered stereotypes, provides a male identification figure for children, and demonstrates how men
can care and be responsible for children.

Partington (1997) also expressed concern about the absence of male teachers in primary education.
Such concerns are not confined to the New Zealand system. North American researchers Brookhart
and Loadman (1996) stated:

‘There is a critical shortage of male candidates entering elementary teacher
education programs. Their small numbers pose a representation problem in an
educational system that increasingly values diversity’. (p.207)

The males who enter teaching training or the teaching profession in the USA show a different pattern
of qualifications and attitudes than their female counterparts. In their study of over 2,000 male pre-
service and in-service elementary (primary) male teachers in the USA, Brookhart and Loadman (1996)
found male teachers to be less academically oriented, more poorly qualified upon entry to teacher
education programmes, and less committed to school than female teachers.

The OECD statistics indicate that there is a strong relationship between teacher salaries and the
proportion of males to females in an education system. The higher the salaries, the more males. The
OECD Indicators 1998 comparisons for teacher salaries reveal the New Zealand rates to be well
below the OECD mean however recent years have seen increases in teachers’ salaries. In Hungary and
Czechoslovakia, the two countries with the lowest teacher salary levels, the proportions of women
teachers are highest, at 94 percent and 93 percent respectively.

As will be discussed throughout the review, recommended outcomes of research on teachers almost
invariably require that teachers should be knowledgeable about, understand, be competent in, and take
action in relation to some issue or other. But what does the research say about the conditions of New
Zealand teachers’ work and the time and other resources available within present structures?
Livingstone (1994, 1999) found the average working week of primary and intermediate teachers on
school-related activities to be 54.6 hours for teachers and 61 hours for teaching principals. These hours
included six hours on weekends and reflected the reality that more than half of the work done by
teachers was over and above face-to-face teaching hours. Livingstone (1994) found that 50 percent of
teachers perceived that the impact of recent changes in workload (eg, due to curriculum changes) had
negatively affected their quality of work.

Livingstone (1994) observes that the teachers’ comments ‘gave a sense of a group of committed
people under severe and mounting pressure’ (p.vi). Of the teachers, 38 percent said they would leave
teaching if that choice was open to them and 40 percent of principals in the later study said that ‘if
they were able to make a choice they would leave teaching’ (Livingstone, 1999, p.viii).

Garden (1997) found that there were higher levels of dissatisfaction amongst science teachers, with 55
percent reporting they would leave teaching if they had a choice. Garden (1997) found also that
primary teachers themselves ranked the social status of teachers below all other professions, lower
than that of nurses, and as closer to labourer than professional.

Although gender issues in classroom practice were not specifically mentioned by the teachers and
principals in Livingstone’s (1994, 1999) studies, the implementation of new curricula was given as
one of the most stressful workload factors. The behaviour of children and disciplinary issues were a
high to moderate stress factor. Also, issues of inclusion for special education were one of the highest
concerns for teachers. Livingstone (1994) found that teachers wanted more time to cope with
curriculum innovation.
Studies of teacher workload have also been carried out for secondary teachers, as reported in Bloor (1996). Without the continuous face to face teaching typical at the primary level, secondary teachers are still working at comparable levels to primary teachers, spending 55 to 60 hours per week on average on school-related activities. However, Māori teachers on average spent, over and above their normal professional duties, a further 28 hours per week engaged in activities over and above normal professional duties directly related to being a Māori in the profession, making these teachers’ workloads 76.9 hours per week.

These teachers were also expected to take responsibility for disciplinary problems with Māori students whom they did not teach. At least half of the sample of Māori teachers considered their undergraduate training to be inadequate. In relation to Māori teachers in secondary schools Bloor (1996) concluded:

‘The picture that emerges from these data is of a physically, spiritually and socially strained group within the teaching profession. Similar to the secondary teaching profession generally (Bloor & Harker, 1995) the data … suggest recent workload changes and demands have had an adverse effect in all areas of Māori teachers’ health and well-being.’ (p.48)

These contextual findings raise a cautionary note about deriving implications from the ‘teachers must’ strategies that were endemic throughout the research reviewed.

Nonetheless, in recent syntheses of research, and considerations of the links between educational policy and student outcomes, teachers are perceived to be critical to any development in schooling. For example:

‘Schools are being asked to play a key role in helping OECD societies adapt to social and economic change; they will not be able to meet such challenges unless teachers are at the centre of the process … attempts to transform teaching and learning must not neglect the teachers themselves, whose expertise, motivation and organisation needs to be brought to bear in support of change, rather than being neglected or, worse still, regarded as an obstacle.’


Individual teachers have a much larger role than schools to play in directly influencing student achievement. Cuttance (1998, 1998a) highlighted this emerging realisation by researches in the school effectiveness and improvement fields. He pointed out that teachers contribute to about 40 percent or more of the variance in student achievement outcomes, whilst schools contribute to between about eight and 19 percent. Ingvarson (1998) identified the same realisation as arising out of the educational change literature. He stated:

‘A central message from the research on change is that it is worth investing in people and their development. Change policies that focus on teacher quality and the quality of teaching lead to the accumulation of experience and “instructional capacity” (Corcoran & Goertz, 1995). They pay off in the long run, not only in terms of student achievement, but in terms of the bottom line.’ (p.1028)

Educational development must operate within fiscal constraints on educational expenditure. Accordingly, it is important when considering the goal of raising student achievement to identify where expenditure would have the most impact. In a review of 60 studies about the relationship between resource expenditure and student achievement, Greenwald, Hedges and Laine (1996) investigated the ratio between significant student achievement gains for money spent. Specifically, they compared the impact of every additional $500 spent in four areas: lowering pupil–teacher ratios,
Explain and Addressing Gender Differences

increasing teacher salaries, increasing teacher experience, and increasing teacher education. They found the greatest effect on pupil achievement to arise from increasing teacher education, the next greatest to arise from increasing teacher experience, followed by teacher salaries, and finally, lowering teacher–pupil ratios.

3.5 SCHOOLS

In 1988, Tomorrow’s Schools: The Reform of Education Administration in New Zealand was released by the then Prime Minister and Minister of Education, the Right Honourable David Lange. This document signalled a different relationship between New Zealand communities and their schools through the increased power of parents in their governing role on school boards of trustees. McQueen (1999, p.20) described the reforms as ‘a top down attempt to get more empowerment at the local level’ and a response to a community that was questioning the ‘educator’s rhetoric about meeting the needs of every child’.

The Treasury (1987) foreshadowed the contradictions for equity policies in the ‘Tomorrow’s Schools’ reform, variously portraying the proposed reform as constituting a more responsive approach to disadvantaged groups, and as a move away from ‘outdated’ equity policies. It was stated that …

‘... fundamental structural changes are required if the education system is to meet the needs of presently disadvantaged groups and if it is to become more responsive.’

(The Treasury, 1987, p.19)

But the Treasury view was that the proposed reform should represent a move towards education as training for employment, and a move away from the philosophical commitments to equity and social justice that were seen as outdated remnants of the 1940s and the Fraser era:

‘... the social ideal of equality of opportunity, as C E Beeby has pointed out, ... was the appropriate clarion call for the 1940s ... With rapid technological change, exposure to the competitive realities of the international market and rising unemployment, training for work will ... be seen as a more important objective than it was, say, in the confident days of the early 1960s.’

(The Treasury, 1987, p.5)

Blackmore (1998), commenting on the impact of the market model of education in undermining gender-based reforms in policies and practices across education systems, suggested that …

‘... many gender-sensitive practices in classrooms, curriculum and even the hiring of school principals are often construed as bad for the school’s image in the marketplace of parental choice.’ (p.460)

In the UK context, Ball and Gewirtz (1997) argue that the market model of schooling offers both opportunity and oppression for girls. These researchers concluded that the market model tends …

‘... to exaggerate traditional and sexist as well as progressive aspects of girls’ schooling ... While it may be the case that market forces provide a renewed validity for aspects of equal opportunity discourses in schools, they also open schools up to other discourses which articulate less emancipatory concerns related to fears about adolescent sexuality and resting upon regressive definitions of femininity. Schools must construct their practices within this nexus of opportunity and constraint.’ (p.220)
While Blackmore (1998), Ball and Gewirtz (1997), and a number of other researchers have commented upon the impact of the educational market model on girls, our search strategies did not locate any articles that asked the question about how the market model is serving the needs of boys. Because the market policy has provided the educational context for the decade that is the focus of this review, the review itself provides a useful tool with which to ask the question for the New Zealand context.

Growing concerns about the education, behaviour and well-being of boys in New Zealand schooling during the past five years indicate some disquiet. For example, an increasingly larger number of school suspensions under the market model suggests that some schools prefer not to have some students, and more particularly some boys, as ‘clients’. In the 1996/97 period, as is discussed more fully in Chapter 11, 73 percent of all school suspensions involved boys or young men. Reasons for suspensions include physical assault, continual disobedience, incidents involving drugs, and verbal assaults on staff. Some of these behaviours have been linked to particular ways of ‘doing’ macho masculinity, as is discussed in depth within Chapter 11 (Kenway and Fitzclarence, 1997).

Therapeutic interventions with disaffected or distressed boys may not result in sufficiently effective outcomes for a school seeking to survive in the market. Punitive regimes of exclusion and suspension may be the alternative. Coogan and Williams (1999) carried out an action research study and reported a case study account of the cost of such policies for a 14 year old Māori boy in the care of the Department of Child, Youth and Family Services (previously CYPFA) following the death of his father. Their account of this boy’s seemingly inevitable path to suspension from school makes clear both the structural conditions working against successful intervention, and the impotence of Resource Teachers: Learning and Behaviour to mitigate the effects of such policies in the case of individual students in more difficult circumstances.

During the 1990s, prestigious, formerly single-sex boys’ schools such as Wanganui Collegiate and St Andrews College took the decision to invite girls into the school. There may be a wide range of reasons driving such decisions in the New Zealand context, including funding and equity considerations. However, in other market systems, such as the UK, girls have been portrayed as a desirable commodity because of their perceived potential to lift school achievement statistics and enhance school image within a competitive market.

In England, it has become apparent that single-sex boys’ schools, and schools with high proportions of boys, are much over-represented on the list of ‘failing schools’ (Raphael Reed, 1998). Boys’ schools, such as Hackney Downs School for Boys in London, which had received a positive report from Her Majesty’s Chief Inspector prior to closure, have been closed down because of lower achievement levels on average gained by boys. In a national trend in England, boys’ schools have been over-represented among schools that have been closed down. Such schools have been identified as a result of ‘zero-tolerance’ policies arising from Choice and Diversity — A New Framework for Schools (DfE, 1992, cited in Raphael Reed, 1998).

The market model of education has had a further marked effect on the contexts within which gendered regimes operate. Part of the expressed rationale for the ‘school choice’ policies was ‘to meet the needs of presently disadvantaged groups’ (The Treasury, 1987, p.19). However, with some exceptions, such as the Kura Kaupapa Māori and immersion programmes for Māori (Carkeek, Davies & Irwin, 1994), the weight of evidence suggests that the model has exacerbated disadvantage for the disadvantaged. Hughes, Lauder, Watson, Hamlin and Simiyu (1996) tested the market polarisation thesis, drawing upon longitudinal data from the ‘Smithfield Project’ on 3,297 students across two cities. They found that:
‘In the five years following the removal of zoning, it was students from high SES backgrounds, relative to the residential area in which they lived, who bypassed their local schools in the greatest numbers. This was true for all ethnic groups.

‘Students bypassing their local school had the effect of intensifying polarisation between schools along SES and ethnic lines. When large numbers of high SES students bypassed their local school, the mean SES of the school decreased in relation to the area in which it was located. Movement away from schools in working class areas had the effect of increasing the concentration of working class students in these schools.’ (p.28)

Hughes et al (1996, p.26) also reported that when working class schools did face a spiral of decline ‘attendant changes in their rolls brought with them a series of additional problems which would place the schools, given the socio-economic area they serve, under enormous pressure’. They also used the term ‘turbulence’ to convey the effects of these problems, and the instability of a constantly changing school population on both students and teachers. Such research findings beg the question: what are the effects of such ‘turbulence’ upon the girls and boys from low decile communities who remain within these schools?

Lauder, Hughes, Watson, Simiyu, Strathdee and Walsander (1995), using some of the same longitudinal data from the ‘Smithfield Project’ reported by Hughes et al (1996), also found that while parents across all socio-economic levels knew which high SES schools they wanted their children to attend, such choices were not always translated into reality. For some students’ families, discretionary income for children’s travel to an alternative preferred school was just not available. Processes of exclusionary zoning and ‘cooling off’ meant also that the higher SES schools, rather than the parents, chose and that public choice theory did not work in practice.

Lauder et al (1995, p.53) concluded that the ‘operation of choice clearly disadvantages low SES and Māori students’. In the latest report on the Smithfield Project (Hughes et al, 1999) a significant school effect has been found This reveals between 16 and 21 percent of the variance in School Certificate to be attributable to variance between schools, and 79 to 84 percent of the variance to be attributable to variance between individuals. This school variance level is higher than that cited by Cuttance (1998) for Australian schools.

Hughes, Lauder, Robinson, Simiyu, Watson, Strathdee and Hamlin (1999) found that between 19 and 30 percent of the school variance is attributable to school-mix variables. Due to effects generated by school mix, students attending schools with a higher SES mix will be advantaged and students attending schools with a lower SES mix will be disadvantaged, over and above their actual SES level. Thrupp (1995) carried out an in-depth study of school mix, uncovering the compounding effects on educational programmes of a low socio-economic mix.

The Smithfield longitudinal study (c.f. Lauder et al, 1995; Hughes et al, 1996) of the impact of school choice and market policies has broad implications for issues of equity, particularly for Māori students, Pacific students, and students from low socio-economic status families. The Smithfield Project results suggest also that gender regimes are more likely to be constructed in homogenous groups of students within social class and ethnic (within social class) strata. If school choice policies further polarise schooling by social class and ethnicity, gendered practices are likely also to become more polarised between social classes and within ethnic groups. While schools play such an active role in the stratification of the next generations, they are likely also to play a substantial role in the reproduction of particular kinds of social class-based gendered regimes.
3.6 STUDENTS

In 1998 there were 2,774 primary and secondary schools in New Zealand. Almost a third (32%) of the students in these schools were in low decile (1–3) communities, and almost a third were in high decile (8–10) communities. Data were unavailable for just over five percent of the students, but 38 percent were in the middle, (4–7) decile range (Ministry of Education, 1999).

Māori students represented one-fifth (19.9%) of the New Zealand school population in 1998, Pacific students 7.3 percent, Pakeha and other Tauiwi 67 percent, and Asian students 5.8 percent. (Ministry of Education, 1999).

Asian girls and boys appear to have been performing relatively well in the New Zealand education system, but because there is insufficient research on the experiences of these students in school, these students rarely feature in the present review.

As stated in Chapter One: Introduction, issues for Māori girls and boys were a priority in the specifications for this review. However, although Māori students constitute a fifth of the school population, little research about Māori students in schooling was located for our review (see also Chapple, Jeffries & Walker, 1997). A notable exception was Carkeek, Davies and Irwin’s (1994) study, which is considered in depth in Chapter Ten.

In November 1998, the New Zealand Education Review Office announced that it was establishing Moana Pasefika to co-ordinate nationally the collection, analysis and evaluation of information on New Zealand students of Pacific Islands origin.

While school populations became increasingly polarised by social class during our focus decade, a change of policy in the legal school leaving age (raised from 15 years to 16 years in 1993), and higher unemployment levels have led to secondary students staying at school longer. Teachers and schools now cater for large populations of senior secondary young men and women who would not have remained at school in previous decades.

This development has created entirely new gender issues for teachers managing the learning of a broader range of senior school students whose traditional employment options may no longer exist. For example, female teachers and pre-service teachers have written about their experiences of sexual harassment and verbal abuse from older male students (Bailey, 1996; Harmon Miller, 1997).

3.7 THEORIES OF GENDER DIFFERENCE

Psychoanalytic theory has played a part in considerations of gender throughout the past century, and is still influential in some current work on gender. However, several other theories used to explain gender differences have emerged out of the fields of human development, educational psychology and educational sociology. These include:

- Essentialism;
- Social learning theory;
- Cognitive development theory;
- Gender schema theory;
- Social constructionist theories; and
- Post-structural theories.
To assist readers in interpreting and critiquing the theoretical assumptions and paradigms inherent in the research literature on gender, we have provided a brief account of each of these theories, plus psychoanalytic theory, below.

3.7.1 Psychoanalytic Theory

One of the most widely known psychoanalytic theories is Freud’s. This takes, as a defining point of boys’ and girls’ sexual identity, the resolution of the Oedipal (boys) and Electra (girls) complexes, involving the child’s identification with their same-sex parent. Both boys and girls are considered to have sub-conscious sexual feelings for their opposite sex parent. For boys, the conflict between the love of their mother and jealousy and fear of their father (castration anxiety), results in them renouncing their love of their mother and striving to be like or to identify with, their father, thus taking on a male gender identity. Girls are held to be jealous of their mothers and to blame them for a lack of a penis, and thus transfer affection to their fathers. In so doing, they identify with their mothers as a model and develop a feminine identity. An assumption of Freud’s theory was the given of the penis as the valued norm, and female genitalia as the absence of a penis.

Criticisms of Freud’s original theory are multiple and include its lack of verifiability, the inevitable sex-stereotyping held to be the outcome of ‘normal’ development, its egocentricity, its cultural bias towards the European nuclear family and his failure to understand children’s perspectives (Smith, 1996; Bem, 1981). However re-workings of psychoanalytic theory, presenting a more positive account of women’s gender identity development, have been influential in feminist literature (eg, Chodorow, 1978; Gilligan, 1982).

3.7.2 Essentialism

Within an essentialist view, male and female are essentially and immutably different because of biological, genetic or hormonal differences. These biologically-based differences are seen to manifest themselves directly within behaviour that arises out of a universal essence of masculinity or femininity. Thus genetic differences and biological differences in genitalia are seen as biologically shaping the destinies of boys and girls. The essentialist view is that because girls and boys are essentially different, then their education should be responsive to these essential differences.

The essentialist assumption informed much of the late 19th century research on brain size. The hypothesis was that male brain size was bigger, reflecting higher intelligence. In 1879, Gustave Le Bon, who was considered by many to be the founder of social psychology, drew upon early research on differences in the head measurements of males and females when he stated:

‘All psychologists who have studied the intelligence of women recognise today that they represent the most inferior forms of human evolution and they are closer to children and savages than to adult, civilised man.’

More recently, claims have been made for a ‘psychic’ essentialism that constitutes either the essence of femininity or masculinity. Essentialist theory, and its use in the consideration of gender differences, is considered in depth in Chapter Eleven.

The major criticism of this theory has arisen out of John Money’s research on hermaphrodites (described in Santrock & Yussen, 1978). Money’s research showed the social impact of gender to be greater than the biological impact of sex on the development and well-being of these children, even when they were raised with a gender identity later found not to be their biological gender. The essentialist position has also been criticised because of the evidence of similarities between the genders, and the disappearance over time in the research literature of gender differences in verbal and spatial ability that were initially explained using essentialist arguments (Caplan, McPherson and
Tobin, 1985; Jacklin, 1989; Linn and Hyde, 1989). Recent work in genetics has also revealed genetic structure to be more complex and ambiguous than the original theories of chromosomal difference suggested (Gilbert, 1995).

3.7.3 Social Learning Theory

According to social learning theorists, sex-typed behaviour, just like other behaviour, is learned through the processes of reward, punishment and observation of models (Mischel, 1974, cited in Smith, 1996). When a child receives either positive reinforcement (e.g., praise) or negative reinforcement (i.e., when something unpleasant, such as teasing ceases) for acting in a sex-appropriate manner, he or she acquires behaviour that is consistent with his or her sex. If a child is punished (told off) for acting in a way inappropriate for their gender, the behaviour is likely to cease.

Children learn sex-appropriate behaviour by observing significant role models; these are drawn from two main sources: real role models found in stories, or media stars. Individuals that are similar to the child (e.g., same sex) are considered more likely to be taken on as models. In social learning theory, the source of sex-typed behaviour is therefore located in the sex-coded practices of the child’s community.

One of the main criticisms of social learning theory is that it treats the child as a relatively passive recipient of environmental forces (Bem, 1987) in the face of evidence that shows that children frequently create and police their own social rules.

3.7.4 Cognitive-Development Theory

Cognitive-development theory, articulated by Kohlberg and Ullman (1974, cited in Smith, 1996) emphasises the active role of the child in organising their behaviour around the understanding of themselves as ‘a boy’ or ‘a girl’. The categorisation of the self as either boy or girl and the subsequent valuing of behaviours of others perceived to be similar to the self rely on the child achieving successive stages of cognitive development.

The first step in acquiring a sex-role identity, called self-categorisation or gender labelling, is achieved when the child recognises its own and others’ gender. This occurs around age two to three years. The second stage involves the child noticing sex-differentiated characteristics and acquiring those characteristics that fit with their own sex-role identity. This coincides with children realising that gender is stable over time (gender stability), and with their becoming motivated to evaluate positively behaviour associated with their own identity. The age at which gender stability is achieved is contested, ranging from age two through to age five years.

Gender constancy (thought to occur between the ages of four and seven years) refers to the stage where children realise that sex cannot be changed by superficial transformation, such as changing clothes and hairstyles. Children may become less gender-stereotyped at this stage, when they realise that their gender identity is not threatened by arbitrary changes.

While cognitive-development theory also recognises the impact of the child’s environment on the acquisition of sex-role identity, emphasis is given to the child’s first acquiring the prerequisite cognitive structures and actively managing the information coming to them according to their identity as boy or girl.

Cognitive-development theory has been criticised on the grounds that it does not explain why sex is taken as the most salient difference for organising experience. Relying on what are thought to be universal cognitive structures, it also does not account for cross-cultural diversity in identity formation, or the evidence that shows children display gendered behaviours before they acquire gender knowledge.
3.7.5 Gender Schema Theory

Containing elements of both cognitive-development theory and social learning theory, gender schema theory proposes that sex-typing is mediated by the child’s own cognitive processing — through a schema — and that the gendered nature of the schema is derived from the sex-differentiated practices and associations of the community (Bem, 1987). In short, a child inevitably learns society’s definitions of femaleness and maleness and then uses the filter (schema) of gender (‘masculine’ and ‘feminine’) to encode and organise incoming information. Gender schema theory does not define the contents of masculinity and femininity; rather, it postulates a process whereby individuals encode and regulate their behaviour according to the definitions of ‘masculine’ and ‘feminine’ that society provides. A sex-typed individual then is one whose self-concept and behaviour are both heavily organised on the basis of gender, rather than some other dimension.

3.7.6 Social Constructionist Theories

Social constructionist theories focus on the impact of the gendered social domains, in particular, families, peer groups, popular culture and schools that orient children to interpret and make sense of their experiences. This perspective draws on the work of Vygotsky (1978) in illuminating the extent to which interaction shapes children’s learning and thinking. While the child takes on the gendered meanings of the social world, this process occurs as the child actively constructs knowledge while becoming enculturated into the knowledge and symbols of the society. What it means to be masculine or feminine does not naturally follow from our anatomy.

Social constructionists explain gendered behaviours as constructed through the complex interactions that make up a social environment. Teachers using social constructionist theories attend to the complex structuring effects of the gendered learning environment, rather than focusing on individual boys or girls. Students construct knowledge by linking new learning to their existing gendered experiences and knowledges. Gendered processes are seen to be integral to cultures of learning and pedagogy in enacted curricula. The social processes within the environment provide a framework within which a student understands, negotiates and enacts gendered identity.

Social constructionist theories have been critiqued for their failure to address adequately the disjunctions, contradictions and complexities of gendered experience. Such theories have also been criticised for their failure to address the issue of power in gendered practices.

3.7.7 Post-structural theories

From a post-structural point of view also, identities are negotiated by us in interactions we have with other people and institutions (school, media, family). Post-structural theories argue that we come to know or construct ourselves and the world using the meanings available to us in the stories, representations, or discourses of our culture and time. Because as individuals or subjects we have available to us (and put upon us) multiple and often conflicting discourses and meanings, identity is not presumed to be unitary or fixed, but constantly recreated/negotiated as we take up or resist the positions offered to us.

Post-structuralist theories have become increasingly prominent in explanations of gender difference. Post-structural analyses are concerned with breaking down the male/female binary that is seen to influence how we think about the world, and to constrain the possibilities for males and females. Such analyses examine how gender intersects with ethnicity and class to produce qualitatively different schooling experiences and outcomes for different groups of students.

Post-structural theories have not been widely accessible to educators. To date, the prevalent criticism is that post-structuralists’ use of language is often inaccessible. Post-structuralist theorists frequently
use language to challenge the binaries within language that in themselves are viewed as major tools in
the positioning of gendered identities.

Each of these theories has been variously drawn upon or critiqued in the consideration of explanations
of gender differences in the light of evidence from the research which has been reviewed.

3.8 CURRENT NEW ZEALAND EDUCATIONAL GENDER POLICY

3.8.1 ‘The National Education Guidelines’

The National Education Guidelines (Ministry of Education, 1990) provide a framework for the
delivery of, and schools’ accountability for, education in New Zealand. The National Education
Guidelines were established in 1990 as part of the reform of school management provided for in the
Education Act 1989. In their current form, the guidelines comprise three components:

- The National Education Goals, which state the Government’s goals for the New Zealand
  state education system;

- The national curriculum statements, which establish the knowledge, understandings and
  skills that should be provided to students; and

- The National Administration Guidelines, which state schools’ operational and
  administrative requirements.

Gender and equity are variously addressed in the guidelines in each of these three components. By
law, the National Education Guidelines form part of a school’s charter, and are the basis against which
schools are audited and reviewed by the Education Review Office.

3.8.2 ‘National Education Goals’ and ‘National Administration Guidelines’

The second National Education Goal specifies a need to aim for “Equality of educational opportunity
for all New Zealanders, by identifying and removing barriers to achievement” (Board of Trustees
Information, p.7).

Guideline 1, part 3 of the National Administration Guidelines requires schools to ‘analyse barriers to
learning and achievement’. This guideline is elaborated by a reference to the principle of ‘equal
educational opportunities’ underpinning The New Zealand Curriculum Framework (see below). One
of the barriers that could affect learning and achievement is identified as “cultural differences, for
example, in attitudes towards discipline or the role of women” (Board of Trustees Information, p.16).

The National Administration Guidelines under 5(i) also require Boards of Trustees to ensure that
schools provide a safe physical and emotional environment for students’ (O’Rourke, 1993).

3.8.3 ‘The New Zealand Curriculum Framework’

Gender is specifically mentioned in the Foreword, Principles, and Attitudes and Values sections
within The New Zealand Curriculum Framework (Ministry of Education, 1993c) under the notions of
‘non-sexism’, the ‘gender inclusive curriculum’ and ‘equal educational opportunities’. Elaboration of
the notion of ‘gender-inclusive’ curriculum is also addressed to some extent in each of the specific
curriculum statements related to the essential learning areas. The Foreword to The New Zealand
Curriculum Framework states that:
‘It is a gender-inclusive curriculum, which acknowledges and includes the educational needs and experiences of girls equally with those of boys, both in its content, and in the language, methods and approaches, and practices of teaching’.

(‘The New Zealand Curriculum Framework’, p.1)

In the ‘Principles’ section of the Framework, which gives direction to the curriculum for all New Zealand Schools, it states:

‘The New Zealand Curriculum provides all students with equal educational opportunities.’

and

‘The school curriculum will recognise, respect, and respond to the educational needs, experiences, interests, and values of all students: both male and female students ... Inequalities will be addressed and recognised. All programmes will be gender-inclusive, non-racist, and non-discriminatory, to help ensure that all learning opportunities are not restricted.’

(‘The New Zealand Curriculum Framework’, p.7)

Within its statement on ‘Attitudes and Values’, the Framework also integrates concerns about gender:

‘The school curriculum, through its practices and procedures, will reinforce the commonly held values of individual and collective responsibility which underpin New Zealand’s democratic society. The values include honesty, reliability, respect for others, respect for the law, tolerance (rangamarie), fairness, caring or compassion (aroha), non-sexism and non-racism.’

(‘The New Zealand Curriculum Framework’, p.21)

3.9 HISTORICAL OVERVIEW OF GENDER POLICIES AND DISCOURSES IN NEW ZEALAND EDUCATION

Equality, equity, non-sexism, barriers to achievement, gender-fair, gender-balanced, gender-sensitive and gender-inclusive, are all terms used in current educational policy and debate. Related policies emerged out of particular theoretical and historical contexts. The Ministry of Education’s current position on gender and gender issues is a product of past policies, and the strategies or courses of action that emerged out of, were allowed for, or recommended by these policies.

Table 3.3 below captures some of the discourses or understandings of gender and gender issues that have framed — or have constituted ‘gender’ and ‘equity’ in relation to — official education policy from the 1930s as presented in the literature.
### TABLE 3.3 DISCOURSES OF EDUCATION IN HISTORICAL CONTEXT

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<tr>
<th>Discourses of Education</th>
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<td>1930s &amp; 1940s</td>
<td>Thomas Report 1944</td>
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<td>1950s</td>
<td>The Carry Report (1952)</td>
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<td>1960</td>
<td>Equal Opportunities in Schools</td>
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<td>1970s &amp; early 1980s</td>
<td>75 Education and the Equality of the Sexes Conference</td>
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<td>75-76 National Advisory Committee on Women and Education</td>
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<td>84-85 Women Advisory Committee on Education</td>
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<td>90s-90s</td>
<td>88 WACETS National Policy for the Education of Girls and Women</td>
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<td>90s-90s</td>
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<td>88-90 91 girls and Women Section</td>
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<td>93-96 Curriculum Framework Statements</td>
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<td>93-96 National education Monitoring Project initiatives</td>
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<td>99 Bright Future</td>
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**Notes:**
- Equal outcomes between men and women (1960s-1970s) (liberal right)
- Equal opportunities for men and women (1970s-1980s) (liberal right)
- Equal opportunities for men and women (1980s) (liberal right)
- Equal opportunities for men and women (1990s) (liberal right)
- Equal opportunities for men and women (2000s) (liberal right)
3.9.1 Social Democracy and ‘Equal Opportunities’ in New Zealand Education

Analyses of policy documents from the 1930s through to the early 1980s consistently show that one of the key stated purposes of education policy throughout that period was to increase equality in society. Historically, the single most famous statement of equality in New Zealand education was coined by Clarence Beeby and quoted by the Hon. Peter Fraser in the 1939 Annual Report of the Department of Education:

‘Every person, whatever his level of academic ability, whether he be rich or poor, whether he live in town or country, has a right as a citizen, to a free education of the kind for which he is best fitted, and to the fullest extent of his powers.’

(Cited in Beeby, 1986)

The sentiments of equality expressed in this ideal have come to be called discourses of social democracy (Leahy, 1996; Snook, 1989) or equality of opportunity. The explicit focus on a male citizen through the use of male generic language signalled the contradictions inherent in early discourses of equality. The use of male generic language has been shown in recent reviews of research never to reference females as frequently as males in the thinking of females and males alike (Henley, 1989).

Middleton (1990, 1992), Leahy (1996) and O’Neill (1992) elaborated on the ways in which girls and women were placed in a position of contradiction with social democracy discourse through the 1930s to the 1960s. Expectations of girls at school were framed by essentialist notions (refer section 3.7.2 above) of femininity that strongly associated girls and their future work with domesticity and a small range of jobs. While both girls and boys were offered a common curriculum, optional (and additional) subjects taken by boys and girls, as well as school streaming practices, meant that ‘choices’ reflected current notions of sex-appropriateness. For example, Middleton’s (1992) analysis of the Thomas Report (1944) shows that technical options such as agriculture and engineering were constituted as boys’ subjects, while home-craft and typing were constituted as girls’ subjects. Girls but not boys were required to take home-craft.

O’Neill’s analysis (1992) of the Currie Report (1962) shows that while it was noted that girls were increasingly taking university entrance qualifications, this trend was not linked to the ideal of equal opportunity. Evidence of the historical gendered division of the intended and experienced curriculum is also discussed by Fry (1985) and O’Neill (1992, 1996).

Jones, Marshall, Matthews, Smith and Smith (1995) explain these different expectations of girls and boys in school up until the 1970s in terms of the influence of conservative discourses of gender relations. Conservative discourses endorse traditional and distinct roles for men and women which are seen to be biologically or naturally given. Competing discourses of femininity/conservatism and equal opportunity or social democracy meant that girls and boys were seen as ‘different but equal’.

3.9.2 Education and the Equality of the Sexes — The Feminist Challenge

The influence of conservative discourses of gender relations was not seen to wane significantly in New Zealand until the 1970s. In this decade, international and local pressure from feminist educators saw the inclusion of girls and women in the discourse of equality of educational opportunity (Leahy, 1995). Equality of educational opportunity at this time was based on the premise that boys and girls were essentially the same, but that girls and women were denied access to equal opportunities and outcomes through social and educational practices influenced by faulty stereotypes and assumptions. While the language of these discourses explicitly included both girls and boys, the focus was on girls and redressing the imbalance that was starkly evident in education, and in wider society.
Education was criticised on the grounds that girls (compared with boys) did not have equal access to teacher time (Department of Education, 1989; Kelly, 1988), were under-represented (in school texts as well as in girls’ subject choice) in subjects such as mathematics and sciences (Department of Education, 1980a,b, 1989), and that female teachers were under-represented in the hierarchy of schools (Department of Education, 1976; Jones et al, 1995). From this time, officials from the (then) Department of Education became involved in gender analysis and in developing gender specific policies.

3.9.3 Girls as Deficient or Disadvantaged?

Leahy (1996), in her analysis of the development of gender specific initiatives and supporting research activity within the Department and Ministry of Education, critiques the discourse of disadvantage that underpinned policy debates around the meaning of gender differences. The discourse of disadvantage, or the individual deficit discourse, focuses on girls and women as ‘the problem’ (Densem and Leahy, 1992, cited in Leahy, 1992). Girls are construed as lacking the confidence, self-esteem and assertiveness to achieve the same outcomes as boys, and women as lacking the drive and ambition to take up management roles in schools. Typically, these problems are seen as the product of the different socialisation of girls compared with that of boys. Strategies for achieving equality flowing from this construction of the problem include providing girls and women with the skills and confidence to succeed in schooling and education management. In this discourse, the education system itself is not targeted for change, but is assumed to be largely neutral in producing differences. The discourse of disadvantage is exemplified in the Department of Education’s (1980) pamphlet *Equal Opportunities in Schools* which stated that:

‘Compensatory action is required to prevent expectations which “limit the
aspirations of both boys and girls, and hinder the development of their abilities as
well as their confidence and self-esteem”.’

(cited in Leahy, 1996, p.85)

The discourse of disadvantage drew increasing criticism as research made more evident both the gender bias in schooling practices, and the underlying fallacy of the neutral positioning of the school in this discourse. Resolving gender differences through targeting girls and women effectively ignores or de-emphasises the role schooling is thought to play in actively contributing to gender differences. The influence of social learning theories shifted the emphasis from the individual to the environment or aspects of the environment, and led to various strategies for gender reform. Such strategies included analysing gender bias in texts, developing new texts that did not perpetuate patterned and traditional stereotypes, and helping teachers to identify and correct practices based on sexist assumptions (see *Countering Sexism in Education: A practical guide for educators*, Department of Education, 1989).

A further criticism of discourse of disadvantage was also related to the way in which girls and women are presented in ‘disadvantage’ based arguments. While acknowledging the usefulness of discourses of disadvantage in raising issues for girls (and Māori), post-structuralist researchers, Jones and Jacka (1995, p.171) pointed out the positions available to girls in this discourse:

‘It might be argued that the subject positions or subjectivities offered to girls by liberal education policy/debates do not differ from those traditionally available in patriarchal discourses: girls are seen in both contexts in unrelentingly negative terms as victims who need assistance and special attention for something they lack. As we have seen, they are harassed, disadvantaged, ignored, devalued, “at risk”... the list is endless.’

The danger in defining girls as ‘lacking’ stems from this construction, coming to constitute contemporary knowledge (truth) about girls in schools. Jones and Jacka (1995, p.172) further stated:
'If girls’ subjectivities are characterised by a sense of truth about themselves as somehow incompetent or incapable — or disadvantaged — that provides the meanings which shape their beliefs and practices, including their “achievement.”'

Although the analyses of ‘barriers to learning’ focus on (or are intended to focus upon) institutional barriers rather than the student, the focus on barriers carries an implicit discourse of disadvantage. Consequently, both the schools and the Education Review Office use a mechanism to address equity which is disadvantage focused and, in the light of this review, a relatively blunt instrument for considering issues of gender in schools.

### 3.9.4 Discourses of Gender Difference

Discourses of difference relate to a broad variety of activities. These document the differences in educational preferences and outcomes between the sexes with a view to arguing the fairness or otherwise of educational opportunities. The discourses of difference constitute a wide range of approaches to interpreting gender difference and identifying possible causes. Discourses differ in their location of ‘the problem’ and the strategies called for to address gender differences. For example, barriers to achievement are variously located within inequitable power relations in schools, sexist or sex-typed curricula and pedagogy, and in the attitudes of those involved in education (educators, communities, policy-makers, and so on).

Leahy (1996) reported that discourses of difference were influential in structuring Department/Ministry of Education research and policy that documents differences between boys and girls in terms of achievement and participation. Leahy cites, for example, *Sex Differences in Mathematics* (Stewart, 1981) and *Ethnic and Gender Differences in the Performance in Mathematics* (EIME, 1988), as well as research and resources that identify barriers to achievement. Barriers are identified in analyses of stereotypic representations of boys and girls in texts (*Sex-role Stereotyping in Mathematics [and Science] Text-books*, Department of Education, 1980) and of sexism in administrative procedures and classroom practice (*Ministerial Statement on Girls and Women*, Department of Education, 1978; *Equal Opportunities in Schools*, Department of Education, 1981; *Countering Sexism in Education: A practical guide for educators*, Department of Education, 1989).

The diversity of analyses in the discourses of difference has given rise to a variety of initiatives or approaches to address gender differences. These include approaches commonly associated with principles of fairness and non-sexism (liberal feminism) or taking the bias out of the system. For example, identifying, as a preliminary to their removal, stereotypes in text books and sexist school practices (eg, Department of Education, 1989); and valuing and honouring female knowledge, experiences, and histories. This latter approach is more commonly associated with anti-sexist perspectives, ensuring equal visibility of girls’ and boys’ experiences in curricular activities — the ‘gender inclusive curriculum’.

O’Neill (1992) identified the influence of both liberal and radical feminist perspectives in a review of the curriculum in New Zealand in 1987. Analyses moved beyond a discussion of narrow female sex-roles, to challenge dominant forms of masculinity and femininity, seen as the cause of inequality, and link them to practices within the school and wider social structure. The 1987 curriculum review was not implemented by the incoming Labour Government.

Jones et al (1995) traced the influence of two strands of liberal discourses in education policy. Both strands hold the common assumption (noted in the social democracy discourse above) that all humans have a potential or essence that is independent of race, class or sex, and on this basis assert that all are entitled to equality of opportunity. The two strands of liberal discourse, the liberal left and the liberal right, differ in their reasons for valuing equity and in their strategies to ensure the individual is free from undue fetters. In the 1970s and 1980s, what is now seen as the liberal left fostered a language of
‘non-sexism’ and ‘equality of opportunity’ for women that focused on removing sexual discrimination, thus allowing girls and women equal access to resources and participation in positions of power (eg, Department of Education, 1989).

3.9.5 Māori and Pacific People’s Theories of Gender in the New Zealand Literature

Irwin (1992, p.2) explained the importance of placing Māori culture at the centre of any consideration of gender:

‘It is essential to develop Māori feminist theories in which Māori society and culture are central. This, however, does not preclude the necessity for specific analysis of the needs of women and girls in their own right ....’

Tuhiwai Smith (1992) identified the concept of ‘Mana Wahine Māori’ as providing a broad framework for the consideration of complex issues of equity for Māori women within both a specifically Māori framework, and in relation to links with other indigenous people’s experience.

The centrality of colonisation to any consideration of gender issues for Māori was highlighted by Pihama and Mara (1994). They emphasised (p.230) the importance of deconstruction as a strategy for Māori, both as a tool to analyse the impact of colonisation of influencing social justice for Māori, and as a tool of gender analysis, stating that:

‘Māori women’s knowledge was perceived as secondary to that of Māori men and therefore much of the historical information related to Māori women has been ignored or rewritten to be more conducive to the colonists’ belief systems ... For Māori women, the deconstruction of dominant ideologies is essential to the reclaiming of their own stories, as opposed to those which have been written about them, from androcentric and eurocentric positions.’

In the context of a consideration of Vaine Pasifica: Pacific Islands Women and Issues of Gender, Pihama and Mara (1994, p.232) concluded:

‘In relation to Pacific Islands girls and women, issues of structural disadvantage, curriculum relevance, pedagogical approaches, curriculum access and assessment practices are key areas for educators to analyse and actively address.’

Pihama and Mara (1994) clearly situate concerns for Pacific women in their place in the New Zealand social and economic structure:

‘Lack of statistical data on Pacific Islands women is a loud statement of the disregard for our reality here in New Zealand; a reality usually lived through in silence; a reality of low-paid menial jobs. We are the budgeters supreme; we are the organisers of many a community group; we are often your unpaid volunteers upholding your social equality myth. We have been pained by your dual forces of sexism and racism yet we are undaunted, for in us is the richness of our cultural heritages that New Zealand badly needs. We are the survivors and our children will survive.’


3.9.6 Equitable Outcomes Gender Policy

The late 1980s saw the liberal left incorporate the principle of equity, which recognises that equitable outcomes can only be achieved through the inequitable allocation of resources. This is the notion of
equity seen in the original school charter framework developed in the proposed reforms of educational administration in New Zealand (c.f. ‘Tomorrow’s Schools’) and the 1987 Curriculum Review. (Department of Education, 1987)

At the beginning of the 1990s, The school charter framework included mandatory clauses with respect to principles pertaining to equal opportunities and equity. For example:

‘The board of trustees accepts that equity objectives underpin all activities in this school.’

‘The board of trustees will ensure that the schools’ policies and practice seek to achieve equitable outcomes for students of both sexes …’

(Ministry of Education, 1989, p.5).

Schools were also to develop clear equity goals and objectives. These goals included, but were not limited to, gender equity. Mandatory goals included:

- providing a non-sexist and non-racist curriculum and school environment (Goal A);
- school policies and practices that sought to achieve equitable outcomes for students of both sexes (Goal B);
- the provision of role models to work as exemplars of equity in everyday behaviour (Goal C); and
- policies and practices to eliminate and address sexual harassment of all in the school community (Goal D).

(Ministry of Education, 1989, pp.10–11)

The change from a Labour to a National Government, and subsequent amendments to the Education Act 1989, saw the principle of equitable outcomes and the mandatory goals related to equity revoked. The revoking was explained as a “move away from the detailed, prescriptive nature of the previous guidelines” so as to be “in keeping with the philosophy of self-management inherent in the Education Act 1989”. (Ministry of Education, 1997a, p.10.)

3.9.7 Positionings for Boys as Boys or as Part of the Category ‘All Students’?

While boys were placed at the centre of Fraser’s social democracy policy (refer sections 3.5 and 3.9.1 above) through the traditional use of gendered English language forms, boys have rarely been the focus of gender policy throughout the development of discourses of equality, disadvantage, difference, and equal outcomes in New Zealand gender policy. Rather, the focus has been on achieving equity for girls in relation to boys, who have typically been positioned as an advantaged benchmark group in equity discourses. That John was running while Janet was watching was constituted as a problem for Janet but not for John.

However, there have been examples of equity strategies for boys, notably as a reaction against equity initiatives for girls. For example, in the 1970s, the then Department of Education was found to have justified ‘special provision for boys’ as a counterbalance to:

‘… the general mildness of tone which was thought to reflect the strongly feminine influence in the infant school. The new series attempted to make a compensatory appeal to boys, introducing a more robust atmosphere ….’

Baker and Leahy (1992, p.42) argued that the gendered nature of curricula gives ‘people, men as well as women, distorted views of their identity’. And Alton-Lee and Densem (1992) and Alton-Lee, Nuthall and Patrick (1993) called for consideration of the impact of the social studies curriculum in alienating and ‘othering’ Māori boys.

After interviewing 150 New Zealand early childhood, primary, intermediate, and secondary teachers, Middleton and May (1997) concluded that although research and writing about gender equity policies had been almost exclusively by women and focused on girls, teachers had a different focus. Throughout the interviews for their study, Middleton and May found that the teachers reported that they had been concerned about gender issues for both girls and boys.

In spite of such relatively isolated instances as research which revealed destructive processes influencing boys in classrooms and playgrounds, systematic attention to boys as boys has not been evident in the literature until the decade focused on in this review. Little research has investigated the explicit or implicit valuing of masculinity in schooling. With the exception of Rout’s (1992) study, ‘Being Staunch: Boys hassling girls’, research problematising the intersections of masculinity and violence has been largely unavailable until the mid 1990s.

Although The New Zealand Curriculum Framework (Ministry of Education, 1993c) gives girls and boys equal weight in its language, attention to equity through each of the actual curriculum statements for mathematics, science, language and languages, and so on, has positioned some boys within the default/main/invisible category of ‘all students’ and not as boys. For example, Science in the New Zealand Curriculum (Ministry of Education, 1993b, pp.11–13) alerts teachers to attend to ‘Science for all’, ‘Girls and science’, ‘Māori and science’, ‘Students with special abilities in science’ and ‘Students with special needs and science’.

One notable exception is that boys generally feature specifically in English in the New Zealand Curriculum (Ministry of Education, 1994), where their poorer average achievement compared to girls has generated concern. However, Māori and Pacific boys are either in the ‘all students’ category or identified by their ethnicity, but not their gender.

There has been recent growth in the gender work occurring in educational research about boys’ experiences of schooling in New Zealand. Shane Town (1998) has made clear that some boys find negotiating the regimes of masculinity that police boys’ behaviour deeply problematic to their well-being at school. Bill Hagan (1999) has fostered a series of action research studies from the Manukau Institute of Technology investigating masculinity and schooling and supporting boys’ education. Marilyn Stephens (1996) investigated the intersections of literacy and masculinity for fifth form boys and Jennifer Norris (1999) has explored the ways in which masculinity is enacted in boys’ transition from early childhood to primary schooling.

And community groups such as Men Alive have taken an initiative to seek more explicit attention to boys and masculinity in New Zealand schooling (Potter, 1999).

What is not yet clear is how the needs of and issues concerning, boys, as boys, of different ethnicities, sexualities, disabilities and social classes could be explicitly addressed within national educational policy. The increasing disquiet surrounding issues for boys within the educational market model (refer section 3.5 above) suggests that such policy development is a priority.

### 3.9.8 Gender Equity as Market Choice

Within the discourse of the liberal right, gender differences were undesirable because they result in talent lost from the economy. Liberal right discourses are identified in The Treasury’s briefing to the incoming Labour Government of 1987 and in the report of the Taskforce to Review Education
Explain and Addressing Gender Differences

Administration (1988) (known as the Picot Report). These construe equity as arising from the individual’s ability to choose freely an education that best suits their needs and prepares them for the market.

Devolving power to schools and the communities, thus minimising the role of government in educational administration, would allow individuals and communities to put pressure on their local schools to obtain the kind of educational experience they desired, or to move to another provider. Individuals would not be unduly hindered in their choices by formal, centrally established regulations. Jones et al (1995) were critical of practices supported by this discourse because they do not recognise the material, social and cultural differences mediating an individual’s ability to choose and exert pressure.

The tension between liberal left and liberal right notions of equity are reconstituted in Middleton’s (1990) analysis of the first (1935–1939) and fourth (1984–1990) Labour Government’s education policies. The reforms following the 1988 reviews of education administration are seen as arising from liberal right (market-liberal) ideals of education which frame education as primarily an economic activity (providing for the economy), rather than a social, political or moral one. The move to create an education market with minimal state intervention was tempered in the reforms by political imperatives to address social inequality.

Equity demanded the recognition that some groups were disadvantaged educationally and that compensation was owed these groups in order to allow them equitable outcomes. Although, in 1991, the National Government removed much of the compulsory section of the school charter framework dealing with equity, the Government’s aim to maximise participation in the market required that additional funding be targeted at groups not seen to be performing to their potential.

In the earlier section entitled ‘Schools’ (section 3.5), we reported literature portraying both the disadvantage of girls within the market, and the possibilities for girls. In addition, we traced the Smithfield evaluations of the equity discourses surrounding school choice policies. The evidence of increased stratification of New Zealand children by social class, and to some extent ethnicity, during the focus decade of this review suggests that gendered regimes are likely to become more and more divergently class-based in schooling. We also raised a question about possible added disadvantage occurring for many boys through the market policies.

3.10 TRANSLATING GENDER POLICY INTO EDUCATIONAL PRACTICE: INFRASTRUCTURES

New Zealand has gender policies in the National Education Guidelines, The National Administration Guidelines and The New Zealand Curriculum Framework. The Education Review Office is legally responsible for auditing a school’s compliance with these policies. The policy work of the (now disestablished) Girls and Women Section in the Ministry of Education was instrumental in the development of these policies, and this section worked closely with policy analysts working in education for Māori and Pacific students (Leahy, 1996).

Dedicated attention to, and resources for, issues of equity for girls was evident also in the building blocks behind the initiatives for Australian gender equity reform in education. Examples are: ‘The National Policy for the Education of Girls in Australian Schools’ and the ‘National Action Plan for the Education of Girls’ (1993–97). However, the Australian equity policies for girls were translated into action plans.

Extensive databases were established in Australia to monitor gender equity and the monitoring systems themselves (for example, Yates and Leder, 1996).
In Victoria, the Australian Quality Assurance Review process included an equity-based analysis of school performance (Cuttance, 1998). The distribution of students’ achievement against expected performance standards was graphically shown for different sub-groups of students by female, male, non-English speaking, Kori, and mobility (student arriving during the school year). The school review processes also systematically incorporated a focus on social outcomes. Cuttance (1998, p.1157) included a graphic depiction of disruptive behaviour in one school, noting in passing:

‘The graph shows a fairly typical pattern of boys being responsible for all but a few incidences of disruptive behaviour in primary schools.’

At Federal level the Australians have used the equity initiatives for girls as a platform for broadening gender equity initiatives and policies to include and specifically focus on boys as well as girls, but New Zealand policy has been to mainstream issues of gender equity at the policy level only, while disestablishing the dedicated infrastructure for gender policy.

In August 1992, the Girls and Women Section was disestablished within the New Zealand Ministry of Education. Tagged positions for gender were initially allocated to policy analyst positions within mainstream policy positions in the Ministry of Education, but all the staff previously working on gender in the ‘Girls and Women Section’ left the Ministry and tagged positions were disestablished, unfilled, or the gender emphasis became less prominent (Leahy, 1996).

In the face of professional dismay about the disestablishment of the Girls and Women Section in 1993, the then Acting Manager of Policy, foreshadowed the disestablishment of the Women’s Consultative Group as a potentially positive move, that would result in gender being highlighted in the work of all policy analysts. Provision was also made to refer proposed policy to the Ministry of Women’s Affairs for gender advice, although there was no undertaking explicitly to address male gender issues.

The strategy to integrate gender issues into the mainstream work of policy analysts was problematic in actual policy practice, however. Within two years of the disestablishment of the Girls and Women Section, the Chief Internal Auditor for the Ministry of Education reported his review findings:

‘Gender issues were even more haphazardly dealt with as there was no methodology to consult if people had wished to apply it. Girls and Women section specialists were occasionally consulted and comment from Women’s Affairs was often cited as the way analysts expected to get input on gender issues. I could not be as confident … that the robustness of our policy advice was not affected by our failure to use or have a methodology.’

(Dunn, 1994, p.4; cited in Leahy, 1996, p.156)

Consequently, there appears to have been little policy development during our focus decade compared with that achieved in the previous decade. While the intention to mainstream gender-sensitive analysis throughout policy development fits with many of the findings of the research reviewed, it is unclear what processes and mechanisms would enable such integration to occur effectively, and the body of this review provides an important resource for further consideration of this issue.

Given the radical restructuring of New Zealand schools and the increased stratification of students by social class, the Ministry’s major investment in the National Education Monitoring Project (NEMP) (see Crooks and Flockton (1998); Flockton and Crooks (1997)) now constitutes a particularly critical tool for identifying differences in student achievement by gender, ethnicity and social class. NEMP results have been used extensively in this review.

An important question arising from this current review is: what mechanisms are in place to take up and address the equity issues arising from the National Educational Monitoring Project findings for
poor performance for particular groups of girls and boys (those in low decile schools, Pacific girls and boys and Māori girls and boys)?

Compared to the infrastructures apparent to support the translation of gender policy into educational practice in Australia, the absence of a dedicated educational gender policy unit or taskforce structure since late 1992 has contributed to a vacuum in New Zealand gender policy development.

Australia, through the federal policy document *Gender Equity: A Framework for Australian Schools* (Gender Equity Taskforce, 1997) has identified five strategic directions for action designed to lead to practical action. These are:

- Understanding the process of construction of gender;
- Curriculum teaching and learning;
- Violence and school culture;
- Post-school pathways; and
- Supporting change.

Each strategic direction includes indicators for improvement. Indicators are designed to focus on improvements in both process and outcomes. The framework identifies ten principles for action, national monitoring mechanisms and reporting mechanisms. Notably, the framework focuses on both girls and boys, and …

> ‘... acknowledges that girls and boys should not be seen as homogenous groups and recognises differences based on factors such as socio-economic status, cultural background, disability, sexual preference or rural/urban location.’

(Gender Equity Taskforce for Ministerial Council for Employment, Education, Training and Youth Affairs, 1997, p.1)

What the international (for example, Epstein, Elwood, Hey and Maw, 1998) and the Australian experiences (Kenway, 1997; McLean, 1997) make evident is that explicit emphasis is needed not only on both boys and girls, as heterogeneous populations, but also on the inter-relationship between girls and boys and masculinities and femininities. Kenway (1997, p.4) put it this way:

> ‘It is now quite commonly accepted in the more conceptually robust literature that masculinities cannot be understood without attending to their relationship to femininities within the broader scope of the unruly but patterned gender order and its localised expressions.’

### 3.10.1 Teacher Education

> ‘The quality of teacher training is a critical area for Government attention as it seeks to improve the educational outcomes for young people in schools’

(Education Review Office, Terms of Reference, Pre-Employment Training for School Teachers, 1999, p.1)

Elley (1992), conducted a comparative analysis of results for over 28 countries in the IEA international study of reading literacy results. The study found, across all 28 countries, only three policy indicators for both primary and secondary levels that showed a strong relationship with higher literacy development.
These indicators are more fully discussed in Chapter Six, but for the purposes of this contextual overview, it is significant to note that teacher education was one of the three indicators showing a relationship with achievement across countries. Further, teacher education was significant in these analyses, whether or not the data was compared for scores adjusted or unadjusted. Such adjustments are made using a composite development index to allow for differential educational expenditure and other development indices. Given the relatively low resourcing of New Zealand education compared to the mean expenditure for all OECD countries, this finding of a significant effect despite lower spending is particularly meaningful for New Zealand.

Comparable findings are evident in science (Garden, 1997) and in mathematics (Darling-Hammond, 1998). The links evident between length of pre-service teacher education and student achievement in reviews of United States research have led to four year elementary and secondary teacher training programmes being extended to five year programmes (Darling-Hammond, 1998).

Throughout the consideration of research on gender issues and technology in Chapter Eight, the knowledge and competence of teachers in the use of information technology are shown to be critical in influencing students.

While the nature of teacher education, and also subject matter knowledge, have been shown to be significant in affecting student achievement outcomes directly (Darling-Hammond, 1998), much of the research reviewed in subsequent chapters indicates that these factors are necessary but not sufficient to account for student outcomes. Rather, the research indicates that teacher education must address teacher understandings of gendered processes specifically to enable such understandings to translate into changes for students (Groundwater-Smith & Millan, 1990).

Shah (1989) reported a review of the literature on the effectiveness of the integration of gender issues into pre-service teacher education. The research suggested that an effective permeation strategy would enable a critical approach to both race and gender issues at the outset of pre-service teacher education, within core components and throughout the links between theory and practice in the final stages of pre-service education. The body of the present review provides information about the nature and relative effectiveness of a range of in-service professional development programmes addressing gender equity.

However, in considering infrastructures for addressing gender issues in schools, it is timely to acknowledge the extent of contestation of gender equity issues as valid concerns for teacher education in the New Zealand context. While the gender policy within The New Zealand Curriculum Framework led to the growth of courses focused on gender as (usually optional) subjects for pre-service teachers, Partington (1997, pp.139–140), reporting in the Business Round Table’s 1996 commissioned review of teacher education, observed:

‘Teacher educators often claim that they are short of time, yet massive coverage is given to gender issues. It is radical or hard feminism that dominates teacher education in New Zealand, and it seeks to ensure that no alternative voice is heard. This exclusiveness seems to increase, if anything, with claims to be “inclusive” and to be promoting “critical” and reflective attitudes.’

One of Partington’s concerns (p.140) about ‘strong’, ‘radical’, and ‘hard’ feminism was that single-sex education is generally favoured by ‘strong’ feminists. This prompted him to write (p.xxii) that:

‘Significant improvements would be made in teaching reading, mathematics, science, social sciences, and other curricular areas if a large part of current ideological baggage were discarded and more time spent on substantive knowledge.’
In his report *Teacher Education and Training in New Zealand* Partington (p.6) recommended that:

‘Teacher education should embrace the principle of educational contestability and accept that people of equal intelligence and experience may legitimately choose very different educational priorities.’

During the focus decade of this literature review, major policy changes occurred in teacher education for both primary and secondary teachers. These changes were predominantly in line with Partington’s recommendation. In The Treasury’s ‘Brief to the Incoming Government 1987, Volume II’, it was claimed that there was little research available on New Zealand education production functions. The Treasury argued that the lack of research evidence had …

‘... not dampened the enthusiasm of pressure groups in demanding increases in educational inputs in the form of improved physical amenities, staff/pupil reductions, and longer pre-service teacher training.’

(The Treasury, 1987, p.7)

The pressures of the population bulge moving through early childhood and primary education during the 1990s and secondary schools from 1999, together with related teacher supply issues, led to a policy decision consistent with The Treasury’s and the Business Round Table’s apparent brief to shorten teacher education programmes. In March 1997, the decision was taken to remunerate graduates of three year degrees for primary teacher training at the same level as graduates of four year degrees, resulting in a national move to shortened three year degrees by 1998.

From the early 1990s, universities and colleges of education (in partnership with schools) ceased to be the sole providers of pre-service teacher education for both secondary and primary teachers. A market policy has led to the proliferation of a range of 18 accredited providers, many of whom offer multiple programmes. According to ERO, there are also other providers who are training teachers but are not technically accredited. Such decisions have influenced the length, breadth and nature of pre-service teacher education. The shortening of pre-service primary teacher education has implications for independent disciplinary and subject study, which Darling-Hammond (1998) noted to be critical to teacher capacity to influence student achievement outcomes.

The changes in New Zealand primary teacher education have led to concern on the part of educators such as Professor Emeritus Ivan Snook, who recently urged educators and teacher educators to form a national network. Over 80 educators joined within a week of his invitation being e-mailed throughout New Zealand. In making this request he wrote:

‘Features of the new model are that (1) There is no body of knowledge which defines the profession of teaching and hence (2) all that is needed is some minimal grasp of content knowledge and skills which (3) are best learned “on the job” or at least acquired without the need for “theory,” hence (4) a narrow technicist training is appropriate (5) from which all traces of critical thinking have been removed.’

(Snook, 12 October, 1999, E-mail communication)

In October 1999, the Education Review Office released their review of pre-employment training for school teachers to the Minister of Education. They found that ‘recent graduates from training programmes … have shortcomings in areas which are critical to their meeting the learning needs of all their pupils’ (p.45). The reviewers concluded that:

‘This evaluation does not provide assurance that pre-employment teacher training programmes are meeting the needs of the school-based system.’ (p.45)
Nuthall, cited in this same ERO report, stated:

‘The quality of the teacher is the single most important factor in pupil achievement ... we do not have the research basis on which to build effective degree level professional teacher education programmes, and nothing in the present reforms indicates there is a possibility of building a basis.’

(Education Review Office, October, 1999, p.68)

The New Zealand Curriculum Framework has become not only the framework for the compulsory and post-compulsory school sector but also the default framework for many tertiary teacher education programmes. Rather than bringing disciplinary skills and knowledges to bear on a critical consideration of the curriculum, students are constrained to work within the curriculum areas.

Evident in the body of this review is the power of critical thinking and post-structural theories (c.f. section 3.7.7) to explain the complexity of gendered processes and inform educational responses which are sensitive to gendered power regimes, respectful of students and enabling of student agency. Access to post-structural theories is likely to have been lessened by teacher education policies. Until the recent use of post-structural theories in school-based research, these theories were relatively inaccessible. Post-structural theories still may not fit readily into the constraints surrounding models of in-service professional development in our schools.

The policy change to separate research and teaching at tertiary level has also influenced the nature of pre-service teacher education. Accordingly, much of the teacher action research that is reported within this review was carried out before such policy changes. Such research occurred within the context of programmes that have since been discontinued in New Zealand teacher education. Other programmes offering research-based postgraduate study, such as those proposed by the Massey School of Graduate Education, are emerging from the changes but to date the shift has been away from in-depth consideration of gender in teacher education.

In her account of the development of gender policy in education between 1975 and 1995, Leahy (1996) explained the importance of gender-relevant research in the Ministry of Education’s gender policy development process. In commissioning this review, the Ministry of Education has implemented a strategy to inform gender policy and practice. The following chapters attempt to provide an in-depth consideration of the potential of research for informing both gender policy and equitable and effective practice in the school sector.

**SUMMARY OF GENDER POLICY IN CONTEXT**

1. Recent discourses arising out of the All Black’s ‘loss’ in the Rugby World Cup were used to exemplify the ways in which the undervaluing of girls in our society can still render the label ‘girl’ a cutting insult for a male. The discourses were also used to exemplify the policing of male behaviour and New Zealand’s intolerance of male ‘losers’ (eg, getting fourth rather than first in an international sporting competition). A deconstruction of the role of gender in these discourses indicates that gender is deeply implicated in discourses of success and failure and the way we value people, and femininity and masculinity in our culture.

2. Issues of identity and gender identity are salient to the well-being of New Zealand society: as a country, New Zealand has the highest recorded statistics of male suicide and attempted female suicide in the OECD. The need to focus on intersections of gender and ethnicity is signalled by the higher rate of suicide for Māori. That suicides are highest in the 13 to 19 year old age group raises issues for the current, or potential role of schooling, as well as the wider society, in addressing youth identity issues.

.../continued on next page
Summary of Gender Policy in Context (continued)

3. Gendered patterns in paid employment reveal males and females to be participating in the workforce at comparable levels, although males feature more frequently in full-time paid employment statistics and females predominate in part-time paid employment statistics. There are other marked albeit changing patterns of difference in the nature of male and female paid employment in New Zealand. For example, males have higher education qualifications than females, although this pattern is changing rapidly. Also, whereas males still earn one-sixth more than females, the gender gap in remuneration has reduced markedly since 1981, when males earned on average more than two-thirds as much as women. Further, compared to previous decades, in the period 1989–1999, the focus period of this review, males are featured more highly in unemployment figures than females.

4. A recent shift in economic thinking has repositioned education as an engine potentially capable of fuelling the economy and national prosperity, rather than as a drain or as an area of government spending constituted as ‘social welfare’ spending. This shift has informed the new policy direction of a ‘knowledge economy’. Education has been featured as a key player in potential economic reform and is receiving scrutiny from groups outside of education concerned with the nature and quality of graduates for the workforce.

5. New Zealand expenditure on primary education is substantially below the (average) mean expenditure for OECD countries, and expenditure on secondary education is slightly below the OECD mean. Public expenditure on education has been linked with educational attainment and economic growth. The comparatively low expenditure on New Zealand education at the primary and secondary levels is likely to be influencing both these outcomes overall.

6. Teacher pay, lower student–teacher ratios, and teacher education have been found to be positively related to the future earnings of students.

7. Almost four-fifths (79%) of New Zealand primary teachers are women and 55 percent of New Zealand secondary teachers are women. These proportions are four to five percent higher than the OECD norms for proportions of female teachers. There is much concern nationally and internationally about the proportions of male teachers in primary and secondary schools. These concerns are justified within a perspective where diversity, representation and positive interactions between children and both genders are valued in the way a society socialises its young. However, teacher gender does not of itself ensure teacher quality. U.S. research found that men in teacher training programmes or in the teaching profession to be less qualified, less academically oriented, and less committed to schools. The OECD Statistics 1998 reveal there to be a strong relationship between the proportion of females in teaching and the level of teacher salaries. The pattern reveals that the lower the level of teacher salaries, the higher the proportion of women teachers. New Zealand teacher salary levels are well below the OECD mean.

8. Research during the focus decade reveals primary and secondary teachers’ workloads to be in the range of 54 to 60 hours per week, with primary and intermediate teachers working slightly longer hours than secondary teachers, and school principals working longer hours overall. Teacher to student ratios are higher in both primary and secondary schools than the OECD means.

.../continued on next page
9. Researchers in the school effectiveness, improvement, and school change movements have concluded that the weight of recent research places much more emphasis on the role of the teacher in student achievement and educational development. Much more of the variance in pupils’ achievement is linked to teachers (about 40%) than to schools (about 16%). Accordingly, there has been a shift of attention internationally to the quality of teachers within school systems, rather than the schools themselves. A review of research was carried out on the relationship between student achievement gains and expenditure on teacher salary, teacher experience, teacher education and lowering teacher–pupil ratios. Teacher education was found to have the greatest effect. Teacher experience was found to have the next greatest effect, followed by teacher salaries and lastly, teacher–pupil ratios, although the smallest effect of the four variables, was still significant.

10. During the decade of study for this review, a market model of education has been implemented in New Zealand. The market model was championed both as a vehicle for greater equity, and as a response to outdated equity principles promoted by The Treasury. The model was intended to increase parents’ ability to choose schools for their children. Research has shown that, in general, such choice has favoured the middle classes and been detrimental for families in low decile communities. Consequently, there has occurred a polarisation of school populations along socio-economic status and ethnic lines. Schooling has taken on an increasing role in the stratification of society by socio-economic status. Girls and boys are likely to be experiencing gendered regimes within increasingly homogeneous social class and ethnically-based populations. An exception has been the greater access to kura kaupapa Māori schools and immersion programmes for Māori.

11. The socio-economic mix of a school population has been found to have a significant and a compounding effect on student achievement, which in turn compounds the lower achievement levels of students in low decile schools. Students in low decile schools are likely to have to deal with a ‘turbulence effect’ as the instability associated with student mobility and low school performance compound. Māori and Pacific girls and boys are much over-represented in these turbulent mainstream schools. Māori students comprise one-fifth of the school population and Pacific students 7.3 percent of the school population. Students in low decile schools comprise almost one third of the school population.

12. Research indicates that the market model has both constrained equitable practices influencing girls and offered opportunities for some girls. There are signs — such as the increased suspension rates for boys particularly — that indicate the market model may have been detrimental for some boys. Boys’ schools have disproportionately featured amongst schools closed for poor pupil achievement in Britain, and promoting girls has become a key strategy for schools seeking to improve their image and place in the market.

13. In 1993, the age at which students can legally leave school rose from 15 to 16 years and schools now cater for a group of students who have traditionally been in the workforce. Overseas research has identified a problem for women teachers in the sexual harassment and verbal violence they field from older male students.

...continued on next page
Summary of Gender Policy in Context (continued)

14. The present chapter includes a brief summary of seven theories of gender difference that have influenced discourses about gender and education. These are essentialism, social learning theory, cognitive development theory, gender schema theory, psychoanalytic theory, social constructionist theories, and post-structuralist theories. These theories have variously explained gender difference as biologically based or socially constructed. A brief overview and critique has been provided to enable the reader to draw upon and critique these theories in the face of the evidence provided within the body of this review.

15. Current gender policy in New Zealand is found in the national curriculum statements, the National Education Goals and the National Administration Guidelines. These include statements requiring gender-inclusiveness, non-sexism, equal educational opportunities and the provision of safe physical and emotional environments for children’s schooling.

16. A brief historical overview is provided of equity discourses in New Zealand educational policy development. These policy discourses include social democracy, equal opportunities, equality of the sexes, girls as deficient and/or disadvantaged, various discourses of gender difference, equitable outcomes, and Māori and Pacific perspectives on theories of gender and gender policy. A critique is offered concerning the place of boys and masculinity in the gender policy discourses. Predominantly, boys have been positioned within the default/main/invisible category of ‘all students’. Boys and masculinity have been the focus of recent research and community groups. The tensions surrounding the positioning of gender equity discourses within a market choice policy are briefly considered.

17. Compared with Australia, New Zealand has few infrastructures for addressing gender issues in educational practice. The Ministry of Education disestablished the ‘Girls and Women Policy Section’ of the Ministry in 1992. A subsequent internal audit referred to a lack of a resourced internal infrastructure for addressing issues of gender. This lack undermined the intention to mainstream consideration of gender equity issues throughout the Ministry of Education’s policy processes.

18. Australian federal initiatives built upon policies for girls and women to broaden their gender equity initiatives to include a framework specifically addressing the needs of girls, boys, and gender issues across schooling for groups of different ethnicity, social class, sexuality, rural or urban locality and dis/ability.

19. Australian gender equity policies were supported by strategies such as national action plans, research, wide dissemination of relevant research, extensive gender databases, monitoring systems, systematic reviews of the monitoring systems, and school review procedures, including specific analyses of achievement gains against standards of different sub-groups. The Australian gender equity framework focuses on five key areas: understanding the process of construction of gender, curriculum teaching and learning, violence and school culture, post-school pathways, and supporting change. Each strategic direction includes indicators for improvement, and specifies process and outcome indicators. The policy direction is to give explicit emphasis to both boys and girls as heterogeneous populations, and to contextually situated inter-relationships between masculinities and femininities.

20. Teacher education has been found to be a key factor in influencing student achievement across different curricular areas. For teacher education to be effective in enabling teachers to both raise student achievement levels and attend to gendered processes, gender issues need to be effectively permeated through teacher education programmes, ensuring that clear links between theory and practice are made in those programmes. In an independent review conducted of compulsory sector teacher education programmes, the Business Round Table has directly contested the inclusion of gender issues in teacher education in New Zealand.

.../continued on next page
Summary of Gender Policy in Context (continued)

21. During the decade of focus there has been a radical restructuring of teacher education which is now offered by diverse providers in multiple programmes. The length of primary teacher training has been retrenched back to a three-year programme, although primary graduates of three-year programmes are treated comparably with secondary teachers with four-year qualifications. Other changes in tertiary policy have de-emphasised the role of research in teacher education, and the shortened competitive programmes have reduced resources available to support teacher educators in doing research. In a report in 1999 to the Minister of Education about the quality of pre-employment training for teachers, the Education Review Office concluded that their evaluation did not provide assurance that teachers are prepared to meet current needs. A consideration of factors across the policy and teacher education context suggests that the graduates of such programmes will not be well-prepared to bring to their teaching the two requirements of strong subject knowledge, and a knowledgeable and critical approach to gender.

22. Because of the changes in the teacher education, and research contexts in tertiary education, much of the research reviewed for this review arises from programmes and courses that have since been discontinued in New Zealand teacher education. Subsequent chapters provide a consideration of the value of such research across the curriculum for informing gender policy and equitable and effective practice in compulsory schooling.
PART TWO:
CURRICULUM
Chapter Four: Science Curriculum

The national curriculum document ‘Science in the New Zealand Curriculum’ explains the importance of a high level of scientific literacy for all New Zealand students and the aims of the science curriculum:

‘Learning in science is fundamental to understanding the world in which we live and work ...’

‘Using systematic and creative processes of investigation, scientists produce a constantly evolving body of knowledge and make an important contribution to the decisions which are shaping our world and the world of future generations. Our dependence on science and technology demands a high level of scientific literacy for all New Zealanders and requires a comprehensive science education for all students, as well as for those who will have careers in science and technology ...’

‘The curriculum in science is designed to encourage all students to continue their participation in science education beyond the years in which it is a required school subject.’


4.1 APPROACH TO REVIEW OF RESEARCH ON GENDER AND SCIENCE EDUCATION

In this section of the review, gender differences in the science curriculum area are considered initially in the context of New Zealand students’ achievement by international standards during the decade of study. Then, within the constraints of available information, patterns of participation and achievement by gender are compared with patterns of participation and achievement by ethnicity and social class. The body of this section of the review provides an overview of New Zealand research addressing issues of gender and science education during the 1989 to 1999 period. International reviews and research, and other New Zealand research studies and commentaries written in the late 1980s have been included to provide a context for interpreting the implications of this body of research for policy and educational practice.

Because there has been more classroom research in the area of gender and science education than has been evident in other curricular areas, many implications for practice arise out of this chapter. Accordingly, multiple summaries of some sections have been distributed through the body of the text to highlight and make readily accessible the main points.

4.2 NEW ZEALAND STUDENT ACHIEVEMENT IN SCIENCE: INTERNATIONAL COMPARISONS

Findings from the IEA Third International Mathematics and Science Study (TIMSS), showed the mean performance in science of New Zealand Year 4 and Year 5 students to be at about the same as the international average for each level for the 26 or so participating countries. However, New Zealand ranked 7th out of the seven ‘English-speaking’ participating countries. Garden (1997) pointed out that ‘it should be remembered that 9-year-olds in most countries have had either one or two years less schooling than New Zealand children’ (p.112).

At the middle primary level, gender differences in science achievement favouring boys were observed in almost all countries. However, New Zealand was one of just three countries to observe gender differences in favour of girls. These differences in achievement were not statistically significance (Martin et al, 1997).
At the upper primary and lower secondary levels (forms 2 and 3), New Zealand students performed on average about the same as the international averages recorded for approximately 40 countries for students at these two levels of schooling. At the educational level equivalent to the position of most Year 8 students, boys scored higher than girls in every country. New Zealand Year 9 students, being in their first year of secondary schooling, showed the fourth highest gender difference, favouring boys (Beaton et al, 1996a).

In the science literacy component of TIMSS, the performance of New Zealand students in their final schooling was relatively high when compared to the performance of students in 20 other countries. The mean for New Zealand (529) was significantly higher than the international mean of 500. New Zealand males on average outperformed their female counterparts, with the difference in mean scores being statistically significant. This trend of males significantly outperforming females was apparent in all but one of the 21 countries (Mullis et al, 1998).

### SUMMARY OF NEW ZEALAND STUDENT SCIENCE ACHIEVEMENT BY INTERNATIONAL COMPARISONS

By international standards:
- New Zealand students’ science achievement was about the international average at middle primary level.
- New Zealand students’ science achievement was about the international average at the end of primary school and beginning of secondary school.
- Years 12 and 13 students’ science literacy was very high by international standards.
- While no significant gender difference overall was evident at the middle primary level on international measures, a statistically significant gender difference in favour of boys was evident at the end of primary school and beginning of secondary school.

### 4.3 MEAN DIFFERENCES IN SCIENCE ACHIEVEMENT IN NEW ZEALAND BY GENDER, SOCIAL CLASS AND ETHNICITY — AN OVERVIEW

Where there are comparative data available for mean achievement differences in science in New Zealand by gender, ethnicity and social class (Crooks & Flockton, 1996), gender and social class (Nash & Harker, 1997) or gender and ethnicity (Pratt, 1999), the evidence indicates mean gender differences to be the smallest of the group differences. The mean achievement differences by ethnicity and social class have been found to be substantially greater than those by gender. For example, boys did better on all three (9.7%) of the 31 science tasks for which there were statistically significant gender differences in the NEMP assessment of Year 4 student achievement. But Māori students did, on average, statistically significantly more poorly on 19 (61%) of these tasks. Students grouped by socio-economic status through their attendance at low decile (1–3) schools did, on average, statistically significantly more poorly on over half (54%) of the tasks used to assess performance for this group [20 out of 37 tasks]. Students from schools with over 5 percent Pacific Islands enrolment did statistically significantly more poorly on average on 27 percent of NEMP tasks at Year 4 level.

The 1995 NEMP assessment results for Years 4 and 8 show all statistically significant gender differences on task performance to have favoured boys’ achievement (Crooks & Flockton, 1996). Gender differences were apparent for 9.7 percent of the Year 4 tasks, and were markedly more prevalent in almost a third (30.3%) of tasks at the Year 8 level. Crooks and Flockton (1996) also carried out a survey of student attitudes to science and found that:
‘the survey results present a bleak picture of girls’ enjoyment of science in school, confidence in their performance and ability, involvement in science activities in their own time, and interest in further study of science.’ (p.49)

Māori students performed statistically significantly more poorly on over half (57.6 %) of tasks at the Year 8 level. However, the survey results for Māori students showed no statistically significant differences in attitudes to science at either Years 4 or 8.

The results of the TIMSS showed that although not statistically significant, girls on average were performing at a slightly higher level than boys (Chamberlain, G., 1997a). However, for Year 8, the pattern of difference reversed, with boys typically outperforming girls (2.1% difference between mean scores). Marked differences in performance favoured Year 8 boys for earth science, physics and chemistry. (Chamberlain, M., 1996a).

According to Beaton et al (1996a), the difference between New Zealand boys’ and girls’ (TIMSS) mean scores for Year 8 was higher than the international mean gender difference. (17 compared to 14 internationally).

The contrast between boys and girls in their attitude to science in the NEMP data was evident also in the TIMSS data for Year 8 students, where boys’ responses indicated that they liked science more than girls liked science. Garden (1997) reported that:

‘there is also a strong suggestion that although standard 2 and 3 girls’ performance in science relative to that of boys is very good, even at this level their attitudes and achievement are beginning to deteriorate, so that by the time they reach forms 2 and 3, girls’ average science achievement lags behind that of boys and many girls have developed negative attitudes to the subject.’ (p.251)

The decline in New Zealand girls’ attitude to science during middle to late primary and early secondary years reflects U.S. findings showing a similar decline in girls’ attitudes to science during this period (Sadker & Sadker, 1993; Arámbula Greenfield, 1997). In an international meta-analysis of 18 studies of gender differences in student attitudes toward science Weinburgh, (1995) concluded that in the two decades ending in 1991 ‘boys have consistently shown a more positive attitude toward science than girls. This has not appeared to change over time’ (p.396). She found a stronger correlation for girls than boys between attitudes and achievement, and concluded that ‘a positive attitude is more necessary for girls in achieving high scores’ (p.396). Weinburgh’s finding that earth sciences and general science garnered the largest effect sizes for gender differences in attitudes are consistent with the available New Zealand data for gender differences in attitudes and achievement at the Year 8 level.

The results of TIMSS revealed ethnicity to be strongly related to achievement. Māori and Pacific Islands students achieved means of 13 and 14 percent respectively less than Pakeha students (56%) at the Year 4 level. The overall achievement level for New Zealand students at Year 4 was 51.1 percent but Pacific girls and Māori boys did least well at 40 percent and 41 percent means respectively.

In summary, the primary and intermediate data reveal contrasting patterns between Year 4 NEMP and Year 4 TIMSS results: boys do better on the NEMP tasks but girls achieve slightly higher on the TIMSS assessments. Both the NEMP and the TIMSS results at Year 8 show girls to have achieved more poorly, on average, than boys, and the NEMP Year 8 results show girls performing more poorly than boys on almost a third of the sample tasks. Burkham, Lee and Smerdon (1997) point out that where a gender gap appears to increase as students move through the educational system: ‘This suggests that schools have an active role in gender stratification, rather than simply reflecting societal influences related to gender’ (p.321).
The NEMP data show Māori achievement in science, on average, to be lowest of any group. However, the NEMP sampling methodology did not allow for direct consideration of Pacific students’ achievement. TIMSS data for Years 4, 5 and 8 showed the mean achievement of Pacific students to be lowest of any ethnic group, but Māori boys were an exception to this at the Year 5 level, receiving the lowest mean achievement score. The minimal data available related to family social class at the primary level reveal students in the low SES band of decile 1–3 schools to be achieving at a similarly low level as Māori in the NEMP data.

Nash and Harker (1997) analysed the mean achievement in school certificate of students from an original cohort of 5383 students in 37 secondary schools. Results showed the mean differences in science attainment to be over 20 percent higher for students from higher professional families than the mean attainment of students whose parents or caregivers were unemployed, on a benefit or semi-skilled. By contrast, the highest mean achievement difference between girls and boys within social class groupings was the 8.8 percentage difference in favour of girls whose families were classified as lower professional. The largest mean gender difference within any social class grouping was less than half the largest mean difference between social classes.

Notwithstanding the importance of interactions among gender, race and social class in the New Zealand context, the NEMP and TIMSS findings do indicate that there are significant gender differences in the New Zealand data in which girls from each ethnic and social class group are on average less positive towards science than boys.

<table>
<thead>
<tr>
<th>SUMMARY OF MEAN DIFFERENCES IN SCIENCE ACHIEVEMENT IN NEW ZEALAND BY GENDER, SOCIAL CLASS AND ETHNICITY — AN OVERVIEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEMP assessments for primary science achievement showed all significant gender differences to favour boys. Girls, however, achieved slightly higher on TIMSS. The gender gap identified by NEMP in favour of boys’ achievement and attitudes increased markedly through primary schooling.</td>
</tr>
<tr>
<td>According to TIMSS, the mean scores for girls at the middle primary level were higher than those observed for boys; the differences were not significantly significant. However, at the end of primary school, boys were significantly out performing girls.</td>
</tr>
<tr>
<td>NEMP survey results presented a bleak picture of primary girls’ enjoyment, confidence and interest in science.</td>
</tr>
<tr>
<td>Gender differences were smaller than group differences by social class and ethnicity.</td>
</tr>
<tr>
<td>Disparities on NEMP assessments (in order of magnitude) occurred for:</td>
</tr>
<tr>
<td>♦ Māori students (61% of Year 4 tasks)</td>
</tr>
<tr>
<td>♦ Students from low decile schools (54% of Year 4 tasks)</td>
</tr>
<tr>
<td>♦ Students from schools with higher Pacific populations (27% of Year 4 tasks)</td>
</tr>
<tr>
<td>TIMSS findings showed Māori boys and Pacific girls to be the groups most at risk in middle primary science.</td>
</tr>
<tr>
<td>The evidence shows that schools play an active role in the gendered stratification of science achievement and attitudes. The proportion of tasks for which there were significant differences between groups was very high compared to other subject areas.</td>
</tr>
<tr>
<td>Science is centrally implicated in the stratification of student achievement in New Zealand schooling.</td>
</tr>
</tbody>
</table>
4.4 GENDERED PATTERNS OF PARTICIPATION IN SECONDARY SCIENCE EDUCATION

In his analysis of the TIMSS data, Walker (1998) reported that the apparent retention rates to form 6 (Year 12) revealed those for Māori to be lowest at 61 percent and those for Pacific students to be 13 percent higher at 74 percent. The overall mean retention rate for Non-Māori, and including Pacific students, was 85 percent, suggesting a much higher Pakeha retention rate. On average, Māori students who stayed on at school and participated in science performed above the international mean in science. Pacific students who stayed on to participate in senior science did much more poorly by international standards.

The low participation rate of Māori girls and boys in science has been reflected in even lower rates of participation as scientists or within related jobs within the workforce. McKinley (1992) pointed out that the ‘lack of achievement and low participation of Māori is nowhere more marked than in the field of science. New Zealand’s largest employer of scientists and science technicians is the former Department of Scientific and Industrial Research (now Crown Research Institutes). Their statistics show only nine scientists identify themselves as Māori from over 1000 that they employ, and 16 technicians from well over 700 (Collins, 1991)’ (p.2). She reported that the 1989 results for School Certificate (Year 11) showed only 68 percent of Māori students sat School Certificate science compared to 80 percent of Pakeha students.

The New Zealand patterns of participation (and achievement) in science education by gender, ethnicity and social class demonstrate marked diversity for girls and boys by social class and ethnic identity. For the New Zealand context, these diverse patterns support Krockover and Shepardson’s (1995) and Kenway and Gough’s (1998) arguments that in research, a continual focus on science education only ‘on the differences between males and females as unitary categories’ (p.4) is insufficient.

Rather, data about difference in participation and achievement patterns need to be disaggregated by ethnicity, social class and gender. Catsambis (1995) suggests that race, ethnicity and gender interact in the U.S. data, and efforts to address different patterns of achievement and attitudes should be tailored to both gender and race. Although social class shows a strong relationship to science achievement in the international literature when that data is included in analyses (eg, Hanson, 1996), comparatively little research explores the issue further.

These analyses reflected gendered patterns in the New Zealand senior secondary science population. That population includes a higher participation rate for Pakeha and Asian students. Overall, there was a trend for differences in participation rates between boys and girls to reduce over the decade in physics, chemistry and biology (Praat, 1999). However, the different participation rates of girls and boys in 6th and 7th form physics — more than twice the proportion of boys to girls — reflect one of the most marked gender differences in subject selection in secondary schooling in New Zealand.

4.4.1 Physics

The largest gender difference in science participation in schooling over the decade occurred in physics. In 1989 41.4 percent of 6th form boys elected to do physics and 15.6 percent of 6th form girls elected to do physics. Girls’ participation in 6th form physics increased by just 1 percent by 1997 and boys’ participation dropped to 35.3 percent. However, boys’ overall participation in physics remained at more than twice the rate of girls’ participation. The same pattern has been apparent in 7th form participation rates in physics for girls and boys with boys’ participation more than double that of girls’. However, the participation of both genders in physics relative to other subjects decreased slightly over the past few years. This trend may be an artefact of the later school leaving age. In her international meta-analysis Weinburgh (1995) was surprised to find that boys had only a slightly more positive attitude to physics than did girls.
4.4.2 Biology

The second most marked gender difference in science participation occurred in biology. In 1989, 40 percent of 6th form girls opted to do biology compared with 23.9 percent of boys. By 1990, boys’ participation in biology increased by almost one percent and girls’ participation decreased by 1.6 percent. The participation of both girls and boys in 7th form biology decreased between 1990 and 1997, with 38.2 percent of girls and 27.2 percent of boys electing 7th form biology in 1990. The differences in levels of participation between the genders were also less marked than in the 6th form.

Although girls’ participation patterns suggest they prefer biology to chemistry and physics, Weinburgh’s (1995) international meta-analysis showed boys to have more positive attitudes toward biology than girls. Weinburgh cited Johnson’s (1987) findings that ‘girls have a greater interest in parts of plants, growing seeds, how animals have young, and medical applications of knowledge, while boys have a greater interest in speed, electric circuits, floating and sinking, and technological application in the physical sciences’ (p.395). Although biology was the science type for which the gender differences in attitudes were lowest, even in this science subject boys had a more positive attitude than did girls.

4.4.3 Chemistry

Boys’ participation in chemistry was almost four percent higher than girls’ in 6th form chemistry in 1989, but the difference reduced to just over two percent by 1997. Both girls and boys were slightly less likely to do chemistry in 1997, but because this period marks a substantial increase in all students staying longer at school, the decrease may reflect the student population change rather than preferences for chemistry. The same pattern of decreased preference for chemistry occurred at the 7th form level, possibly reflecting the same change of population of students. However, 10 percent more boys than girls chose to do chemistry in 1990. This difference almost halved by 1997 with, in the 7th form, 26.4 percent of boys and 20.8 percent of 7th form girls electing to do Bursary Chemistry in that year.

## SUMMARY OF GENDERED PATTERNS OF PARTICIPATION IN SECONDARY SCIENCE EDUCATION

<table>
<thead>
<tr>
<th>Summary</th>
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<tbody>
<tr>
<td>There is a very high attrition rate of Māori students from secondary science, but those Māori students who do participate in senior science perform above the international mean at Year 13 level.</td>
</tr>
<tr>
<td>Māori rates of participation as scientists or in related jobs in the labour force are markedly low.</td>
</tr>
<tr>
<td>Pacific students are more likely to participate in science at senior secondary level than Māori, but these students’ average performance is much lower by international standards and well below the international mean.</td>
</tr>
<tr>
<td>Pakeha students continue to participate in senior science at higher rates than Māori or Pacific students.</td>
</tr>
<tr>
<td>The relative proportion of senior students participating in physics and chemistry in the senior school has been steadily dropping as larger numbers of students stayed on at school and selected other subjects.</td>
</tr>
<tr>
<td>There is a marked gender pattern in boys’ much higher participation in senior physics – more than twice the rate of girls’ participation in this subject. Boys have slightly more positive attitudes toward physics than girls.</td>
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Almost twice the number of girls as boys do senior biology in the 6th form but this difference reduces markedly in the 7th form. Although girls participate more in biology, boys have more positive attitudes towards biology.

Gender differences in participation rates in senior science have been reducing over the decade.

4.5 GENDER DIFFERENCES IN SCIENCE ACHIEVEMENT AND ATTITUDES — SECONDARY IN FOCUS

In this section, we explore the disparate gender patterns in science achievement, and attitudes towards science in New Zealand secondary schooling.

The two international sets of comparisons of male and female achievement in science during the focus decade reveal New Zealand boys to be achieving more highly in science than New Zealand girls, both in their first and final years at secondary school. However, examinations and formal assessment results within the New Zealand secondary school system consistently reveal girls’ achievement in science on average to be slightly higher than that of boys.

The results of the IEA’s Third International Mathematics and Science Study for a 1994 cohort of 3rd form or Year 9 students revealed a more marked difference between boys’ mean achievement and that of girls than any of the results for the three younger cohorts. Boys’ overall TIMSS achievement at the outset of secondary schooling was over four percent higher on average than that of girls. This difference in mean achievement was the fourth largest significant difference to be observed across all countries participating in TIMSS. (Chamberlain, M., 1996a, Beaton et al, 1996a)

What is of particular concern about the pattern of TIMSS results at the outset of secondary schooling is that the mean achievement score of Pacific students (44%) is substantially lower than that of Pakeha students (62%) and the overall mean of 57.7 percent. Māori student achievement (50%) is on average considerably lower than Pakeha achievement, and Pacific student achievement is lowest by a substantial margin.

This pattern of relative achievement by ethnicity is evident for the percentage of B grades and above in school certificate, and performance, in 6th form biology, chemistry and physics in 1997 (Praat, 1999). The 6th form physics mean score is confounded by the much lower participation of girls in that subject. Those far fewer girls (relative to boys) who did participate in 6th form physics gained the highest mean score (62.6%). Māori girls’ performance (46.7%) was slightly lower than the overall mean (49.7%), and Māori boys’ performance was substantially lower (30.0%). However, the low participation rate by Māori hides in the achievement statistics, the large numbers of those students who do not continue to participate in science education at all. Pacific girls (37.7%) did better than Māori boys on average but substantially more poorly than Māori girls. Pacific boys’ mean achievement in physics was very low at (21.0%) - less than half that of the overall mean achievement rate.

In direct contrast to the TIMSS findings, and throughout the decade for school certificate, sixth form and bursary examinations and assessments girls have been, on average, achieving more highly than boys in science (Sturrock, 1993; Praat, 1999). Both at the outset of the decade, and in the 1997 statistics, girls doing 6th form biology and physics were more likely to get more grades of 4 and above, whether they were in the majority of students participating in the subject as in biology, or in the minority as in physics (Sturrock, 1993; Praat, 1999). The discrepancies between the average achievement of male and female students in the senior secondary school in the 5th, 6th and 7th form assessments appear to have increased by a slight margin in favour of girls over the decade.
Research literature shows little attempt to explain this slightly higher mean achievement by girls in internal and national science assessments. Martin (1996) in her analyses of the TIMSS data for Year 8 and Year 9 found that girls were reporting doing more homework in science than boys, but their achievement was significantly lower than boys on average at this level. One argument advanced in the international literature has been that girls perceive they have to achieve more highly than boys to succeed, because of differential financial rewards in the labour force favouring males. Gilbert (1998) suggested that this pattern of higher achievement for girls and lower mean achievement in ongoing assessments for boys in science is an outcome of the new market. She argues that boys’ lower achievement in science signals a shift in their focus, which is securing for them a competitive advantage in the market place:

‘(T)his is occurring at a time in which the world outside schooling is changing in ways that mean the ‘goofing off’ behaviour for boys, is, for them probably not an entirely inappropriate response. We currently celebrate the entry of increasing numbers of young women into what were the high-status professions of law and medicine, professions which require of their practitioners a huge knowledge base ... just at a time in which these professionals are being re-defined as being the ‘providers’ of health or ‘legal’ services, and in which their status is diminishing. Middle-class young women are moving into these professions at a time when middle-class men are not entering them, but are instead moving into the information technology, financial and investment sectors. These sectors are distinguished by their valuing of risk-taking, ‘creative’, ‘innovative’, or ‘breaking set’ behaviours (behaviours associated with competitiveness and aggression, and therefore with masculinity) .... ’ p.13

Kenway and Gough (1998) argue that a recent widening of the gender gap in Victoria (Australia), in science achievement in favour of girls, increased female participation and lower male participation in science subjects such as chemistry, and the overall drop in student participation in science for both boys and girls in Australia since 1992, raise pressing questions.

The overall scientific literacy score of New Zealand years 12 and 13 students (in their final year of schooling) on the TIMSS international comparison reveals a marked pattern of diversity in New Zealand science educational outcomes. A marked gender disparity in favour of boys was apparent on this kind of international assessment. According to Chamberlain, G., (1998a), New Zealand males on average outperformed New Zealand females in science literacy (543 compared with 515). Furthermore, males in three of the four ethnic groups – Pakeha, Māori and Asian – on average outperformed their respective female counterparts. Pacific females’ performance was not dissimilar to the performance of their male counterparts.

Although the result for Māori is possibly confounded by a lower participation rate in senior secondary school it is worth noting that the means for Pakeha, Asian and Māori males were (numerically) above the international mean for males (521). The means for Pakeha, Asian and Māori females were also higher than the international mean for females (482). These findings on the TIMSS science literacy assessment which, in general, showed that males significantly outperformed their female counterparts illustrates the complex picture when examining gender differences across assessments.
SUMMARY OF GENDER DIFFERENCES IN SCIENCE ACHIEVEMENT AND ATTITUDES — SECONDARY IN FOCUS

Boys achieve more highly in science at secondary level on international assessments but girls’ performance on national and internal assessments is slightly higher on average than that of boys.

From 1989–1999, girls’ achievement in secondary science as measured on 5th, 6th and 7th form assessments was slightly higher than that of boys. This pattern shows a gender reversal in science achievement, but only on national assessments — not international assessments.

Traditionally gendered patterns are countered by the much poorer performance of Māori and Pacific boys in senior science. Research on classroom processes and student learning in science should include these boys as a priority because of their much lower mean achievement patterns.

Research on classroom processes and student learning in science should include Māori and Pacific girls.

Pacific students’ secondary science achievement is markedly low in 5th and 6th form.

Pacific boys’ performance in physics achievement at 6th form is half the overall mean rate for all students. Pacific girls’ physics achievement was almost twice as high as that of their male counterparts but was still low.

Māori boys also do poorly in 6th form physics. Māori girls did markedly better than Māori boys at this level, but were still performing slightly below the overall mean.

Boys’ lower achievement has been explained as an outcome of the new market, as boys abandon science and move into information technology, financial and investment sectors.

There has been little New Zealand research carried out to investigate these patterns of differential achievement in secondary school science.

4.6 DIFFERENCE AS AN INDEX: BROADER QUESTIONS OF GENDER AND SCIENCE

Mean differences in participation and achievement in science education by gender provide indicators only of the broader ways in which gender influences students’ learning in science. That New Zealand’s gender differences in achievement, or gender gaps, are amongst the biggest in the international TIMSS comparisons suggests that gender is particularly salient in New Zealand educational practice in science. However, the differences provide only indices, hiding both the substantial overlap in the experiences of girls and boys in science education, and the magnitude of the differences. Gendered differences permeate children’s relationship with the physical world and even their understandings about planet earth and beyond, because so many elements of experience have been culturally imbued with gendered meanings.

That science as a subject has been traditionally masculine and western has been a continuing focus of the research literature in this field. However, how, whether and to what degree the particular forms of masculinity inherent in traditional western science influence, or should influence, and are enacted in the curriculum of New Zealand primary and secondary schools, pose questions for this review. Clearly, the empirical evidence signals that any consideration of gender requires a consideration of the participation, experiences and learning of both boys and girls of different ethnicities, social classes, disabilities and cultural traditions. Such relationships are not additive. Even the empirical patterns for gender and ethnicity in the New Zealand data signal the complex ways in which gender interacts with identity in science education.

At the outset of this decade, a strong critique of researchers’ perspectives on gender differences within science education was that they tended to focus on problems or supposed deficits in the gendered student - usually the girl (as explained by Baker, 1994). In our decade of study, there has been a range
of foci in the research on gender: curriculum, texts, the nature of science, enacted curriculum, pedagogy, teachers and teacher education, family resources and so on. However, there is still little research evident in which the interrelationships amongst these, and the links between policy and practice, are seriously interrogated or theorised.

**SUMMARY OF DIFFERENCE AS AN INDEX: BROADER QUESTIONS OF GENDER AND SCIENCE**

<table>
<thead>
<tr>
<th>Gender appears particularly salient in New Zealand educational practice in science; the gender differences operate in complex ways variously for males and females.</th>
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<tbody>
<tr>
<td>Science carries traditionally masculine gendered associations.</td>
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<tr>
<td>Gender, ethnicity, social class and cultural traditions are not additive. The New Zealand data signal complex ways in which gender and identity interact in science education.</td>
</tr>
<tr>
<td>Research is needed that can address the complexity of the intersections of gender, social class, ethnicity, identity and science education.</td>
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### 4.7 TEXTS

#### 4.7.1 English Language Science Texts

In an overview of previous research, Bell (1988) linked the under-representation of girls and women in science to the portrayal through science texts and films of science as a ‘male’ subject. Whereas the Department of Education (1980b) carried out a systematic analysis of sex-role stereotyping in science texts used in primary and secondary schools in the 1960s, 1970s and 1980s, no systematic comparative analyses have been carried out for science texts used in New Zealand schools in the 1990’s. Analyses that have been carried out indicate that the male bias identified by the Department of Education remained a feature of science texts in the early 1990’s. Hamlin (1989) carried out a comparative analysis of illustrations in the first 29 pages of two secondary textbooks widely used in New Zealand in the late 80s: *School Certificate Science: Physics* by Deborah Epp, (1983) and *Active Science 1*, a fourth form general science textbook by Linda Griev and Sue Ball (1986). Hamlin concluded:

> ‘When comparing the number of females illustrated in the textbook *Science for the Seventies*, the Department of Education study found that 20 percent of all illustrations were of females. In a second textbook, *Science for the Eighties* they discovered 18 percent were of females, and this study has shown a total of 22 percent of females in two even more recent texts. From these results, it would appear ... that there has been no significant improvement in the sex-equitability of texts.’ (p.8)

Fitzpatrick (1990) analysed the illustrations in Windridge’s (1988) text *Science for All: Book One*, and a booklet published for children by the Department of Science and Industrial Research in 1989: *Discover Science with the DSIR*. Both these later publications showed more marked gender bias with only one female amongst the 18 scientists depicted in the DSIR booklet, 10.1 percent of the illustrations in the first 25 pages of Windridge (1988) depicted females, while 74.7 percent of the illustrations depicted males. The Windridge (1988) text positioned one of the few women in its illustrations under the heading *Problems in the Laboratory*.

We have located no comparative analyses of texts produced in response to the new national curriculum document. However, it is likely that texts produced in the middle to late eighties have been in use in schools over the focus decade of this review. Science texts are a product of the education market and are not necessarily constrained or influenced by educational policy regarding equity. The
few analyses available suggest that Byrne’s (1993) question asked in the context of the Women’s Suffrage Centennial Science Conference was valid for the New Zealand context:

‘But when we come to ask why it is that women are both filtered out, and absent from both the taught history of science, and the reality of science and technology today, despite female achievements which go back to, indeed, predate, the Middle Ages, we often hear more received wisdom than sound, logical and research-based answers’ (p.1)

To emphasise her point, Byrne (1993) cited Lise Meitner’s Nobel Prize for her introduction of the term ‘nuclear fission’ into scientific vocabulary; Dorothy Crowfoot Hodgkin’s Nobel prize in chemistry for her work in determining the structure of chemical compounds by x-ray techniques; Maria Mayer’s Nobel Prize for her shell model of the nucleus in physics and examples of other achievements of notable female scientists. The absence of readily accessible information about women’s scientific achievements in traditional science curriculum, or specific examples in the new national science curriculum document, led to the production by New Zealand educators of resource reference lists for teacher use. For example, Wilson and Coleman’s (1990) ‘Notable Women’ list of 119 eminent scientists, 93 physicians, 12 engineers and 23 aeronautical pioneers.

Gilbert (1996) argues for a deeper consideration, and deconstruction of the content of secondary science texts. She argues that the way in which ‘sex’ is discursively produced throughout secondary biology texts ‘contribute(s) to the conceptualisation of the category ‘woman’ … as what is ‘lacking’, ‘left over’, or ‘excess to’ man’ (p.37). She critiques the ubiquitous presentation of sex as heterosexual intercourse, the focus on ‘difference’ and the reductionist focus on fertilisation in secondary biology texts.

Gilbert argues that the use of masculinist and military imagery constitutes fertilisation as a ‘self-congratulatory narrative’ of the ‘heroic sperm’: “Students who are learning the ‘biological facts’ of sex are thus presented with a set of images in which fertilisation is the ‘conquest’ or the ‘overcoming’ by the ‘vigorous’ sperm of the ‘obstacles’ that are put in its way by the female body’ (p.40). The result of this sub-text on gender is that differences are emphasised and ‘represented as active/passive, form/matter binaries’ (p.42).

Gilbert argues further that the “form of the relationship between the sexes is represented not as a co-operative interaction … (or) a ‘new and fertile’ form of (genuine) partnership, but on the contrary, as a violent struggle for dominance, for the suppression of the one by the other’ (p.42). Gilbert supports her deconstruction of texts by presenting alternative scientific representations of sex and calls into question the scientific authority of the material encountered by secondary students in school texts. She concludes that such representations of ‘sex’ maintain wider ‘technologies’ of power through core curriculum.

The presumption of sex as heterosexual intercourse and the focus on fertilisation in core science curriculum was evident in an interview with a young man reflecting on his school experiences, reported by Town (1998):

’sex education covered only the science side of things … the mechanical … talked about how you get pregnant … how the cells divide … only the physical attributes of the human being.’ (p.123)

At the time of the review, no other studies were apparent which systematically focused on the ways in which school science texts depict particular forms of masculinity or masculinities, or have investigated the effects of the gendered patterns in science texts on boys.
SUMMARY OF TEXTS

The under-representation of girls and women in science texts has been linked to the portrayal of science as a male subject.

Analyses of gender bias in texts carried out over 30 years suggest gender bias is still apparent in science texts used in the 90s.

Educators have generated extensive lists of prominent women scientists to counter biased patterns of omission by gender.

Post-structuralist analyses of science texts reveal masculinist discourses and gendered binaries that maintain gendered regimes through curriculum.

Masculinist discourses in science texts generate support regimes of gendered power relations.

For example, textual discourse of the conquest of the female body by the sperm provide representations of gendered relations as a violent struggle for dominance rather than a cooperative and fruitful interaction between the sexes.

Students need alternative discourses with which to critique texts, both to challenge the gendered regimes and to access better science.

Representations of sex in science curriculum create heteronormative environments that are exclusive of gay students.

The silence surrounding relational and emotional dimensions of sexuality in scientific considerations of sex creates problems for students attempting to understand their own sexualities.

4.7.2 Science, Texts and Māori Language

The beginning of the focus decade marks a shift in educational curriculum policy in the intention to enable the use of Māori language in science texts. In 1989, the Ministry of Education’s Draft Forms 1–5 Science Syllabus for Schools stated that ‘Māori people … have the right, if they wish, to learn science in the context of their world and in te reo Māori (p.13)’. McKinley, McPherson Waiti and Bell (1993) cited the draft national science curriculum statement link between instructional language and benefit: ‘Māori benefit more from science education when the opportunity exists to learn science through the medium of te reo Māori’ … (p.249).

McKinley, McPherson Waiti and Bell (1993) stated that ‘Scientific vocabulary development is seen as necessary to enable te reo Māori to be a useful language in … science classrooms’ (p.251). They cite the dictionary of scientific and technological terms (Te Taura Whiri I te Reo Māori, 1992) as an example of such development. McKinley, McPherson Waiti and Bell (1993) reviewed international research that demonstrates the link between higher achievement and indigenous language usage, and explored a range of challenges and advantages in the use of Māori language in science. They note that ‘there is no research into teaching and learning science in Māori’ (p.250), and argue that there is a need for such research.

They suggest, among a range of research priorities, the need to investigate ‘In what ways and to what extent are the learning outcomes (cognitive and affective) in science influenced by the learning of western science in te reo Māori’ (p.255). McKinley, McPherson Waiti and Bell (1993) affirmed that ‘Māori want their children to learn both western and indigenous science’ and called for research into Māori science.

The lack of such research means that there is little information about the availability of Māori medium texts in science education for Māori girls or boys. However, Hohepa’s (1997) overview of Māori medium texts in literacy indicates that there are ‘minimal resources available to teachers working in
Māori language schooling contexts’ (p.66). The TIMSS research on middle primary science education revealed that instruction was conducted in te reo Māori for only 2 percent of the sample — four classes (Garden, 1997).

<table>
<thead>
<tr>
<th>SUMMARY OF SCIENCE, TEXTS AND MĀORI LANGUAGE</th>
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<tbody>
<tr>
<td>There was a shift this decade to enable the use of Māori language in science texts.</td>
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<tr>
<td>International research on indigenous language use in education demonstrates cognitive and cultural benefits.</td>
</tr>
<tr>
<td>Te Taura Whiri i te Reo Māori, the dictionary of Māori scientific and technological terms, constitutes a key resource in this development.</td>
</tr>
<tr>
<td>Māori language science texts will be critical to the development of Māori language science curriculum.</td>
</tr>
<tr>
<td>There is an absence of research on learning and teaching science in Māori.</td>
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4.8 CURRICULUM

Baker and Leahy (1992) provided a strong critique of the distorted representations of society occurring through school curricula, and argued that such distortions are damaging to both males and females.

‘The gendered nature of ’basic curricula’ damages and dehumanises by giving people, men as well as women, distorted views of their identity, society and history. The diverse experiences of girls and women in New Zealand, particularly Māori girls and women, are often left out of any such base curricula.’ (p.42)

In an overview of recent international debates about the nature of science education, Bell (1991) traced the influence of the ‘science for all’ approach, and constructivist understandings of learning on the development of the new national science curriculum. Bell (1991) cited Fensham’s (1985) critique of previous science curricula as designed to serve the needs of the 20 percent or so of students going on to become scientists or take up science-related professions. Drawing on Hodson and Reid (1988), Bell described the new ‘science for all’ perspective as aimed at universal science literacy. Bell (1991) explained that the focus on the contexts teachers might use to teach specific science could enable teachers to take into account and respond to differences between different groups of students:

‘Girls may relate more to social concerns and human problem-solving contexts (for example, road safety, science and the disabled). Māori students may relate better to contexts which acknowledge and give value to their own experiences and culture. For example, astronomy may be linked to the navigation methods of their ancestors.’ (p.172)

In 1993 the ‘Science in the New Zealand Curriculum’ statement was first published and distributed providing New Zealand teachers with an explicit policy statement requiring a gender-inclusive curriculum. The document included a specific section addressing ‘Girls and Science’, and specifying that the particular perspectives of Māori and Pacific girls should be acknowledged in science education. While the ‘Science in the New Zealand Curriculum’ statement explicitly directed teachers to ensure a gender-inclusive curriculum, the document itself perpetuated the pattern of low visibility of women in science texts by specifying only one woman scientist by name throughout the text: Jane Goodall’s research on chimpanzees was the one exceptional use of a female example. Alton-Lee (1993) contrasted the isolated explicit mention of Goodall, and the absence of the explicit mention of Roslyn Franklin in the phrase ‘the people who were involved in the decoding of DNA’ p.33, with the greater explicit visibility of men in the document. These are the repeated mentions of Pasteur and Semmelweiss and the inclusion of van Leeuwenhock, Jenner, Lister, Fleming, Watson and Crick.
A Māori curriculum statement for science education, *Te Tauaki Marautanga Putaiao: He tauira* was published in October 1994. Significant issues arising out of this landmark curriculum statement are taken up by McKinley (1999) and reported in depth later in this chapter.

Baker (1994) noted the importance of the national curriculum statement in ‘including girls in science programmes through an emphasis on ‘responsive(ness) to the strengths and needs of girls’, but cautioned:

> ‘Implementation of the gender inclusive curriculum is dependent on the way the documents are initially transcribed into a school programme, and then on their delivery within the classroom.’ (p.40)

### SUMMARY OF CURRICULUM

The distorted views of society and history reflected in the gendered nature of traditional science curricula give students distorted understandings of their own identity.

The new curriculum embodied a ‘science for all’ approach rather than meeting the need of the few students going on to become scientists. Science for all aims at universal science literacy.

The new curriculum offers multiple contexts to enable students to link new learning to their own experiences and cultural identities.

The policy of the new curriculum was a gender-inclusive policy.

The structure of the new curriculum included explicit mention of only one woman scientist and continued a tradition of the greater visibility of men in science texts.

The decade marked the introduction of the Māori Science Curriculum *Te Tauaki Marautanga Putaiao* published in 1994.

The potential of the new curriculum to be gender-inclusive in practice depends upon the ways in which the documents are translated into the school science programme.

### 4.9 SCIENCE PEDAGOGY AND ENACTED CURRICULUM

A substantial international research literature has focused on gendered patterns in classroom interaction [eg, Kelly, 1988; Randall, 1987; Sadker and Sadker, 1993]. At the outset of the decade, Kelly’s (1988) meta-analysis of 81 studies of classroom interaction had just been published. Many of these studies of classroom interaction included large samples, with the largest including 102 classrooms.

Kelly’s analysis showed that girls participated in 44 percent of public classroom interactions across curriculum areas, and the percentage was similar whether the interactions were pupil or teacher initiated. Girls received fewer responses opportunities, fewer questions and fewer teacher questions demanding a higher level of reasoning. Boys received 68 percent of behavioural criticism from teachers.

Kelly (1988) carried out separate analyses for mathematics, reading, science and social studies data. Social studies showed the strongest gender difference and science the second greatest disparity. In science classes, boys received 57.3 percent of all interactions, 55 percent of teacher praise, 77 percent of teacher criticism, and 56 percent of instructional interactions with the teacher.

In response to finding marked gender bias in U.S. classroom participation patterns in science classes, Sadker and Sadker (1993) argued that teachers need to gather data to become aware of how gender bias might be operating in teacher-pupil interactions in their own classrooms. They suggest specific areas of verbal participation, praise, criticism, remediation or acceptance be assessed. They suggest
also that older students should be involved in such data gathering, and subsequent discussions of issues of fairness. Sadker and Sadker (1993) report that when teachers increase their wait-time after asking questions and before accepting answers, girls are more likely to be able to participate publicly.

They emphasise the importance of teachers separating instruction from management, so that teachers are attending to, and rewarding, appropriate behaviour in a gender-fair way, rather than attending to and inadvertently rewarding the inappropriate behaviour of boys.

These researchers suggest desegregating classes because informal segregation by gender can influence teachers in spending more time with boys in science. They also found that when teachers increase their own geographic mobility in a classroom, they are less likely to ignore quiet students. Sadker and Sadker (1993) also suggest using cooperative groups to build student confidence, with the proviso that individual accountability is emphasised, and teacher instruction includes attention to the effective operation of group work.

Tobin and Garnett (1987) expressed concern that, in spite of the published research on gender differences in classroom interaction patterns, ‘most science teachers would proclaim that gender differences in achievement and participation do not occur in their classroom’ p.(93). They observed classroom interaction patterns in the science classes taken by 15 secondary science teachers in Western Australia, who were unaware that gender differences might be occurring in their classes. The researchers found that males participated to a greater extent than females in the public interactions with these teachers, and in the data collecting segments of laboratory activities. Gender bias was most pronounced in whole class sessions. These were the predominant mode of instruction. Although the gender bias showing more male participation occurred also in most ‘low ability’ classes, Tobin and Garnett reported that in some low ability classes, there was very little public interaction by either boys or girls.

Hacker (1991), also in Western Australia, studied interaction patterns of 15 year-old boys and girls in science classes taught by 12 male teachers in Western Australia, and found no significant differences favouring boys. Hacker did find two slight significant differences, indicating that girls were more likely to make a referral to the teacher or consult with another pupil than boys. Hacker stated that the quality of previous research on classroom interactions had been disappointing. Hacker (1991) concluded that:

‘This study suggests that that the classroom environment does not provide the key to understanding these moderately large gender differences in science achievement (boys’ higher mean achievement as reported for Australian students in the Second International Association for the Evaluation of Educational Achievement Science Study) ... and it may provide evidence for the importance of biological rather than environmental factors.’ (p.444)

We question whether Hacker would now attribute biological causation to girls’ high achievement in school science, given the more recent trend of a greater gender gap between male and female achievement in science, with girls performing more highly in Victoria, Australia (Kenway & Gough, 1998).

Alton-Lee and Nuthall (1991) found a stronger gender disparity than the international mean in teacher initiation of responses in an New Zealand primary class. In an analysis of a year 5 science unit introductory class brainstorm on ‘Weather’, teacher initiation responses from boys was 60 percent, and from girls to be 40 percent of overall responses. Gender bias in introductory unit brainstorm was apparent for all three of the social studies and science units they studied. They argued that such gender bias has the effect of biasing unit content, and the enacted curriculum, to boys’ experiences,
perspectives and prior knowledges when it occurs in a brainstorm used to enable students to link new curriculum knowledge to their existing knowledge.

New Zealand intermediate teacher, Spencer Cheung (1992) reported that he was ‘sceptical about the extent to which gender-bias operates in science education (in New Zealand) … (he) believed that the use of carefully selected curriculum resources and effective teaching strategies to ensure high pupil involvement should overcome problems of equity’ (p.1) He designed an action research study, within the context of a whole-school gender equity programme, to explore the issues and demonstrate that such bias was not occurring in his own class.

Cheung (1992) focused on both curriculum and pupil participation. He set his class an imaginary problem ‘Special Mission: Rescue New Zealand’. The imaginary problem was that New Zealand’s land mass was rapidly diminishing and the students successively had to select scientists, comic characters and imaginary roles for themselves to participate in imaginary rescue committees to resolve the crisis. The unit built upon previous knowledge the children had gained about landforms, rock and soil formation and the effects of human usage of land. The students had two preparatory periods for library investigation, to search science references and resources to assist in their identification of likely candidates. He set four different discussion topics and allocated students to three mixed gender and three segregated small groups to enable himself to gather data about the interaction patterns within each group.

Cheung’s collated data for the mixed group participation revealed that on average the boys were almost twice as likely to speak as girls, although one girl who was elected as spokesperson by her group was an exception to the overall pattern. When one small group suggested 25 male members and no female members and 96 percent of the characters selected by three groups were male, it became quickly evident to Cheung that the marked gender bias was a characteristic of the rescue committee composition, for both boys and girls.

Cheung then introduced a ‘teacher prompt’ intervention, which involved simply saying to a group: ‘Please feel free to name prominent scientists of both sexes for your Committee.’ He used a parallel prompt for one group for their selection of scientists, but not their comic characters; for a further group from the original he used no prompt condition for their choice of comic characters; and for both conditions for a third group.

The groups who received prompts only for the scientist selection nominated 52 males (69.3%) and 23 females (30.7%). The group who received prompts only for the comic character selection nominated 25 males (59.5%) and 17 females (40.5%). The group who received prompts for both tasks nominated 20 males (47.6%) and 22 females (52.4%). He concluded that if a teacher explicitly makes gender-balance a consideration, through a simple prompt strategy, then pupils may overcome their tendency to focus on male experience. He suggested a practice effect in the double prompt condition.

**SUMMARY OF SCIENCE PEDAGOGY AND ENACTED CURRICULUM — 1**

Boys participate in more interactions with teachers on average than do girls in science classes across many countries. Some exceptions to these findings have been evident in Australian research.

The few New Zealand studies of gender-bias in public interactions in science classes have shown the male bias to be greater than that reported on average in international studies.

Gender-bias is most evident in interaction patterns during whole class lessons.

.../continued on next page
Greater public participation by boys in science lessons can ensure that new information is linked to their experiences, perspectives and knowledge.

During science classes, boys receive on average more teacher praise, more teacher criticism, more instructional interactions and more teacher interactions overall than girls.

Boys receive on average more behavioural criticism than girls during science classes.

Biological and essentialist explanations of boys’ higher achievement in science have become self-evidently wrong in the light of girls’ higher achievement in science in some contexts.

The research literature shows teachers are often sceptical of the gender-bias findings until they have carried out observations in their own science classrooms.

Teachers are encouraged to gather data to become aware of how gender bias might be operating through verbal participation, praise, criticism, remediation or acceptance in their classes.

Research on gender and science education has generated a broad range of gender-sensitive and inclusive teaching strategies in response to revealed gender bias in curriculum and classroom interaction patterns.

Teacher action research enables teachers to identify the actual gender and participation patterns operating in their own classes, to develop pedagogical responses accordingly, and to evaluate their effectiveness.

A simple prompt strategy used by teachers to remind students that scientists of both genders could be included in their considerations can be influential.

Older students should also be involved in data gathering and subsequent discussions of the data with respect to principles of fairness.

When teachers use wait-time after asking questions, girls are more likely to be able to participate publicly.

It is demonstrably helpful for teachers to separate instruction from management, so that they are attending to and rewarding behaviour in gender-fair ways (rather than rewarding the inappropriate behaviour of boys.

It is advisable for teachers to desegregate students in coeducational classes, because informal segregation influences student attention to boys.

When teachers increase their geographic mobility in class, they are better able to attend to quiet students.

Gilbert and McComish (1990) focused not on the amount of classroom talk, but on the kind of classroom talk, and participation that might facilitate science learning. They focused on exploratory talk as a ‘means of helping students to be more actively and personally involved in exploring and developing their own ideas’ p.40) Gilbert and McComish described an investigation by Gilbert into using exploratory talk as part of a normal secondary science programme. Gilbert and McComish identified two pre-conditions for exploratory talk: the design of the learning activity and the composition of the student group. Gilbert compared all female, all male and mixed-sex small groups.

Gilbert and McComish identified two types of tasks that encourage exploratory talk: creative problem-solving tasks, and tasks requiring students to solve a problem using selected information from input. They also specified task outcome, input and cognitive level as important task elements for facilitating exploratory talk.
Gilbert found that the girls-only group created the best conditions to facilitate exploratory talk. The boys-only group experienced more interruptions, less feedback, and tended to ‘compete rather than cooperate, and spent large amounts of time arguing over procedural matters’ (p.46). In the mixed-sex group boys dominated the talk, received more feedback and were less likely to be interrupted than their peers in the boys-only group. Girls in the mixed-sex group were less able to engage in exploratory talk.

Gilbert and McComish (1990) proposed that these findings suggest ‘that because groups with boys in them are not likely to provide good conditions for exploratory talk for everyone, a training process which focuses on group dynamics is necessary for them’ (p.47). The authors suggest also that all students need training in group techniques which facilitate exploratory talk. They argue that both cooperative oral language and written language activities can produce learning experiences ‘which are good for all students, but particularly for the girls’ (p.55).

**SUMMARY OF SCIENCE PEDAGOGY AND ENACTED CURRICULUM — 2**

A successful strategy for teachers is to use cooperative groups to build student confidence, but individual accountability should be integrated into task design and group functioning.

Girls’ communication patterns have been found to be more facilitative of exploratory talk and cooperative approaches in science education.

Students, and particularly boys, require training to use group techniques which encourage and optimise exploratory talk.

Cooperative oral and written language activities used in group contexts can produce learning experiences which are good for all student but particularly girls.

When teachers use cooperative group structures their instructions need to address explicitly the effective operation of groups.

Through reviewing research on learning and gender in science and mathematics Baker (1994) identified five key approaches as ways in which teachers might systematically ‘place girls in a central position with boys’ (p.47) in science education. These were: (a) facilitating students’ active engagement in learning through involving students in ‘making, identifying, responding, instructing, sorting, explaining, challenging, exploring, questioning, investigating, researching, predicting, analysing and discussing’ (p.48); (b) developing students’ skills in science; (c) using girls’ strengths in collaboration and sharing; (d) ensuring the desirable outcomes for girls such as risk-taking ability and confidence are included in science assessment; and (e) embedding science education in ‘real-world social concerns and in people-oriented contexts’ (p.50). Baker (1994) elaborated on her fifth point, arguing that teachers should focus on the social construction of science to help girls actively identify the ways in which such patterns are produced, and the influences on their own lives. She suggested that such strategies would enable teachers to challenge the male bias in texts, curriculum and the traditional presentation of science, but cautioned that such strategies constitute a ‘fundamental shift in the construction of programmes.’ (p.52).

Baker’s (1994) call for facilitating students’ more active engagement in science classes is consistent with research by Burkham, Lee and Smerdon (1997). Using a nationally representative U.S. longitudinal database, these researchers found that ‘Hands-on lab activities — relatively infrequent in high school science classes — continued to be related to all students’ performance, but especially to girls’ (p.297). McGinn and Roth (1999) also critique the traditional portrayal of science and scientists in science education, and call for a different kind of pedagogy in science classrooms. Based on recent ethnographic studies of the work of scientists McGinn and Roth (1999) conclude that such studies:
Explain ing and Addressing Gender Differences

[Text from the image]

McGinn and Roth (1999) argue that traditional science teaching approaches provide insufficient opportunities for 'students to develop competencies that will lead to competent participation and civic responsibility in a society infused with science and technology' (p.22).

Their review emphasises the importance of: student involvement in initiating exploration, diverse curricula resources rather than monolithic texts, and the use of writing in science education. They suggest that strategies such as facilitating interplay between small group collaboration and whole class discussion, and student generation of visual re-presentations of data are pedagogical approaches that better reflect the actual work of scientists.

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A series of six studies in the Understanding Learning and Teaching Project at the University of Canterbury were designed to trace and compare the opportunities to learn of low, average and high achievers in science and social studies units (Alton-Lee, 1984; Alton-Lee and Nuthall, 1990; Nuthall
& Alton-Lee, 1990). The ULT Project included two studies of Year 5 student learning in science, and two studies of Year 7 and 8 learning in integrated science and social studies units.

In the first of these studies, a low achieving Pakeha girl, Diane, spent much time, apparently on task, interacting with curriculum content about erosion, pollution and endangered animals that she did not learn (Alton-Lee, 1984; 1990). The average time Diane spent interacting with content she did not learn (18.9 minutes per item) was much higher than time spent on curriculum content not learnt by a high achieving Pakeha case study boy, Gus (5.4 minutes per item).

Observations revealed that Diane was following the teacher’s directions more closely; however, the teacher’s explicit instruction focused mostly on task production and presentation. Diane spent much more time focused on the presentation and neatness of her work to the point that she left out critical information about the processes of erosion in a diagram she drew because she wanted it to be ‘neat’ rather than ‘messy’. For the other students erasing or ‘rubbing out’ was found to be positively related to learning and interpreted to be evidence of students changing their ideas but much of Diane’s rubbing out occurred when she was neating headings or illustrations, and was not positively related to her learning. Interestingly, an interview with Diane revealed that she understood the erosion process in question, but in the work she presented for assessment, neatness was her priority, so her assessment was affected.

Diane explained that any discussion of homework in her home would appear ‘smart’ and inappropriate, suggesting a possible interaction between a social class and gender effect, where being a ‘good girl’ was antithetical to conspicuous academic achievement.

The results showed that much of Gus’s off-task or disobedient behaviour facilitated his opportunities to learn: i.e., insistent questioning of the teacher after being asked to sit down and work, arguing, and joining in when the teacher was engaging in individual conferences other students were having about problems with their work. Gus engaged in six times as many public interactions with the teacher as Diane, talked more to himself (six times as frequent as self-talk by Diane), and talked more with his peers during class lessons (four to five times the rate of the girl’s peer talk). Gus’s first priority appeared to be the curriculum content and unlike Diane he always left headings as the last part of his tasks to complete.

Alton-Lee (1998) found that when students did headings after there had been a question generation task, then much productive talk about scientific ideas occurred amongst peers during the artwork.

This study also included an exploration of links between social class, cultural capital and resource access, and in-class learning for Diane, who was from a working class family, and Gus, who was from a middle class family. There was a strong relationship evident for access to relevant life experience and in-class learning — but this relationship was mostly apparent in long-term rather than short-term outcomes. A year after the study, Diane had forgotten what she had learned about a number of items that assumed experiences of glaciers, hills, and mountains that she had not brought to the unit, whereas Gus, who had such prior experiences, remembered what he learnt.

For all three case study students, whether a low average or high achiever, the learning opportunities created when the teacher provided alternative actual experiences or demonstrations of phenomena studied were crucial. Such demonstrations and opportunities not only countered the effects of lack of out-of-school experiences, but showed the highest positive relationship to long-term learning outcomes of any variable studied (Alton-Lee, 1984; 1991).

The emphasis on neatness and production was also a problem for Tui, a Māori boy in a Year 5 study of a science unit on weather who had limited supplies of pens and pencils (Alton-Lee & Nuthall, 1991). Nuthall (1996) described Tui’s efforts to find additional time to work on his weather project
report at a time when the other students would make their pens and pencils available to him. Tui exempted himself from the critical second lesson in the unit, when the teacher gave instructions about keeping a daily record of weather, using a compass and judging wind direction. Tui used this time to create a large coloured heading on his cover page. Tui’s test results showed not only a direct link with the content he missed, but also the cost to his later unit learning which built on the learning experiences in this second class lesson.

Alton-Lee and Nuthall (1991) found that Māori boys, Ricky in the context of a Year 7 social studies unit, and Tui in the Year 5 weather unit, appeared to be alienated by their curriculum experiences. Ricky reported his deliberate decision not to listen to class lessons, and Tui engaged in singing during teacher-directed lessons, choosing songs with a cultural theme such as the theme from the television programme ‘Roots’, and ‘I can sing a rainbow’, with Rastafarian colours transposed into the song.

In Alton-Lee and Nuthall (1992), the curriculum involvement in the science ‘Weather’ unit of a high achieving Māori girl from a middle class family, and a low achieving Pakeha girl from a working class family were compared. They found that within the same group and task structure provided for both students, Rata focused constantly on the curriculum content and engaged in content-related peer discussion. However, in Pam’s interactions, finishing the task became the priority. Student preoccupation with short-cutting the intellectual demands of the task to ensure that the task was finished on time was evident. Pam copied her answers from someone else, was distracted by other conversations and joined in the general group agreement with the peer comment ‘Who cares! We’ve finished!’ (p.7) The researchers argued for attention to multiple cultural differences including gender, class and race in understanding teaching, student participation and student learning in classrooms:

“Our analyses of all the data for these two case study girls indicate that their experiences were shaped by multiple cultural differences. Their ways of participating were shaped by their different perspectives on femininity, their different status and their different ways of negotiating and using the peer sub-cultures in which they interacted. Their ways of engaging with tasks were shaped by different purposes (eg, finishing, producing, getting answers, solving the problem), by their different kinds of cultural capital, and by their different ways of trying to understand their experiences. To understand how these differences develop, we need to understand the cultural dimensions of student’s experiences.’ (p.8)

Alton-Lee and Nuthall (1992) advanced a framework for understanding students’ experience of curriculum as constructed out of a dialectical interaction involving the student in negotiating five kinds of cultural influence. These are: the influence of classroom-specific culture, the culture of the wider society (for example, through the language of instruction, the selection of curriculum content, who is constituted as ‘other’ in the curriculum), the peer culture, the teacher’s culture and the students own complex intersecting cultural positioning and perspectives. Gender was argued to be a central cultural influence in each of the five areas of influence.

Nuthall (1996) explored the contrast in classroom peer sub-cultures in the valuing of peer ideas. He gave examples relating to discussions of Antarctic climate in a year 7 class, where a low achieving Samoan girl both received and gave abusive comments about getting things wrong in class. Teine was the recipient of Nathan’s ‘So much for your brilliant spelling, Teine’ and further inaudible apparently abusive comment. She was also the author of ‘Oh … dick! Stupid idiot … (laughs) Doesn’t even know’ when Lapana, a male peer, was unable to answer a teacher question (p.28). Nuthall contrasts those interchanges with the kinds of interactions beginning with ‘Amazing!’ ‘How do you know?’ ‘I thought … ’ ‘So … ’ among Maude, Koa, Joy and Paul that supported high achieving Joy and Paul’s learning. Nuthall (1996) concluded:
There is no evidence that some students need more relevant experiences than other students to learn … there was no evidence of materials being too difficult for low ability students compared with high ability students … The major factors affecting whether or not students access or create learning opportunities in different ways all appear, in one way or another, to be related to culture … (A)bility related to the difficulties students have living and translating between those deep knowledge structures and beliefs that constitute the teacher’s classroom culture and the deep knowledge structures and beliefs that constitute their own culture’. (p.30)

SUMMARY OF SCIENCE PEDAGOGY AND ENACTED CURRICULUM — 4

Some on-task behaviours and attitudes, associated with good girl or good student positionings such as neatness and primary emphasis on headings and presentation can undermine or subvert a focus on learning in science.

Students can lose learning opportunities through seeking to please through presentation.

Teachers can use simple strategies to focus students on learning as a priority. For example, requiring students complete headings last, or making provision for specific focus on presentation style and design in the context of the art curriculum.

When students did headings and artwork subsequent to a question generation activity, much talk occurred around the curricular content.

Some disruptive, argumentative or insistent questioning behaviours, and peer talk can support science learning.

The ways are complex in which good and bad behaviour are constituted in the classroom and linked to appropriate gendered behaviours, appropriate social behaviours and effective learning behaviours.

Teachers need to plan management strategies that facilitate learning and create a cultural environment that facilitates the learning and participation of all students.

The ways in which class experiences are linked to students’ prior experiences can be critical to students’ long-term learning. When teachers provide actual demonstrations to illustrate science processes or contexts that are unfamiliar to children, all students benefit.

Teachers need to help to generate and support Māori boys and girls in linking curriculum to their own experiences.

Effective teacher use of language is inclusive of the diversity of all students within a class. For example, ‘those of us who are Māori, those of us who are Samoan, those of us who are Pakeha, those of us who are Cambodian … /those of us who are girls and those of us who are boys.

A focus on shared community enables inclusivity rather than ‘us’ and ‘them’ othering of children according to gender, ethnicity, sexuality or other differences.

Gender, ethnicity and social class intersect in complex ways to influence the ways in which students negotiate curriculum and their place in the peer culture. Multiple cultural differences influence classroom learning processes.

Gender operates at each of five levels of cultural influence in classrooms: the classroom-specific culture, the culture of the wider society as embodied within language and curricula perspectives, the peer culture(s), the teacher’s culture and the complex intersecting cultural positioning of a student.

The major influences on whether or not students access or create learning opportunities are related to culture. Gender is enacted as a cultural practice.
Jones (1991) focused on education as a cultural practice when she carried out one of the few in-depth New Zealand ethnographic studies of learning and teaching in secondary schools. She took a role as student/researcher/participant/observer and accompanied, in class and school, 19 Pacific girls whose parents had immigrated from Western Samoa, the Cook Islands, Tonga, Niue and Tokelau. Jones contrasted the experiences of the Pacific girls through three terms in the fourth form and one term in the fifth form with those of a class of middle class Pakeha girls.

Jones (1991) found that the resistance of working class students to schooling evident in landmark British studies (for example, Willis, 1977) were rarely evident in the Pacific adolescent girls. Rather, these girls emphasised the importance of schooling and their determination to work hard and learn. However, Jones observed that there were gaps between their classroom behaviour, their professed commitment to learning and 'getting School C', and their school outcomes.

Among other curriculum areas, Jones (1991) explored the complex ways in which both the Pacific girls and their teachers produced patterned ways of participating in class that did not support deep learning or high achievement in science. The girls themselves perceived ‘getting the teacher’s knowledge’ to be important, and placed much weight on copying curriculum information provided by the teacher.

The teachers often ignored the students’ questions or ideas; not deliberately, argued Jones, but because ‘the teachers often seemed to find the girls’ approach so outside the framework they were using that they did not or could not incorporate the girls’ ideas in their responses to them’ (p.127). In one example, a teacher asked a question about the origin of the gas bubbles which arose in an experiment demonstrating the reaction between acid and metals. Two of the girls responded that the gas arose from the metal and the air but the teacher responded: ‘Don’t be silly. The gas is hydrogen. What is the formula for the acid? (p.129).’ Jones pointed out that the teacher’s response reinforced the idea that it is the teacher’s correct knowledge that is important, and the vital processing that is necessary for the girls to amend and link what they already know and understand with their new learning was bypassed or cut short.

Not only was the teacher’s knowledge seen as correct but also the precise vocabulary used by the teacher could be a barrier to student learning. On occasion when a student did give a correct answer but in a different form than that sought by the teacher and used in the syllabus (for example: ‘body’ rather than ‘organism’), the girl would ‘get it wrong’ while not understanding that the mistake was the form of language used rather than the underlying concept.

Like Alton-Lee and Nuthall (1990), Jones (1991) found that teachers’ explicit instructions emphasised neatness of notes, headings, pictures and niceness rather than understanding of the curriculum content. When teachers did emphasise understanding, the students did not have the approaches or the metacognitive strategies to gain understanding of the curriculum content. Rather, they attempted to memorise their notes. Jones (1991) found that memorising was a somewhat more effective strategy in biology because the assessment of Human Biology at school certificate level focused on descriptive information more than did the assessment of other science subjects.

Jones (1991) contrasted the classroom practices produced by Pacific girls and their teachers with those produced by middle class pakeha girls, where she identified ‘a ‘match’ between the middle-class girls’ class cultural approach to teaching-and-learning and those of their teachers’ (p.136). The middle class Pakeha girls integrated their school learning into their out-of-class conversations, were pro-active in the classroom involvement and learning, independent in approaching learning tasks and even challenging or critical of their teachers’ knowledge. Their teachers facilitated and encouraged these girls’ independent approach to the curriculum. The girls and their teachers engaged in sustained
dialogue enabling the teachers to be diagnostic, and allowing the students to link their existing knowledge to their new learning in science.

Jones (1991) concluded that:

‘Cultural tendencies produced by the complex social and material conditions of students’ lives contribute to their responses to classroom life — particularly to them ‘doing schoolwork’.

‘Schools unwittingly make particular cultural ‘tools of appropriation’ of school knowledge successful through their teaching and assessment procedures.

‘These tools are not explicitly offered to all students as part of the teaching process. Rather the school unconsciously incorporates the dominant group’s class/ethnic cultural assumptions about teaching and learning as prerequisites for its rewards. This often involves the school in the process of ‘teaching’ middle-class children how to acquire school knowledge (at the same time unwittingly not teaching this to the children from subordinate groups).’ p.143

Although Jones (1991) reported that the teachers recognised her portrayals of classroom practice as valid, and were keenly interested in discussing ways in which they might change their practice, she was cautious about the potential for change. Jones argued that ‘successful change in teacher practice involves change in what students do as well.’ (p.178). She argued that students need to learn explicitly, and understand which ways of participating in curriculum are rewarded by examinations and which skills lead to school success. Jones also comments that how Pacific student fare educationally depends on their economic position; teachers ‘cannot simply produce social and educational equality’ (p.179).

As McKinley (1995) noted, while there has been little research on science education and Māori in mainstream schools, few Māori students have gone on to take up jobs as scientists. With the notable exception of Jones (1991) research, there has been also little research available for this review about one of the lowest achieving groups of both boys and girls in New Zealand — Pacific students.

U.S. research indicates that gender and ethnicity intersect in complex ways in science education. Carlton Parsons (1997) reports a study wherein 20 academically competent black female students from secondary schools in North Carolina were asked to draw scientists. The students were then interviewed using a 33 point interview guide to explore the ways in which they characterised the race, gender, lifestyle, character, occupation and perspectives of their scientist. Carlton Parsons’ research about ethnicity, gender and the dominant cultural perspectives endemic to science teaching in the U.S. context raises the need to investigate similar questions in the New Zealand context.

Parsons found that 11 of the students drew a white male scientist, one drew a white female, four drew a black male, two drew a black female scientist and two did not ascribe ethnicity to their scientists. The scientist as a white male was characterised as non-emotional, rational, materially wealthy, and a hard-working man who has little time to spend with his wife and children. The scientist as white female was characterised very much like the white male, except that she tried to balance her work and personal life.

Carlton Parsons (1997) found that the images of scientist as a black person were characterised very differently from those the students used to characterise the white scientist. Unlike the white scientist who was not characterised as very religious, the black scientist was seen as very religious. Self-respect was seen to be important to the black male scientist, who worked very hard but did make time for family and friends. The black female was portrayed as very religious, hard-working, nerdy and
perceived as crazy for her scientific work by others. Either she had no family because of her work, or she was a scientist for her family’s sake. Carlton Parsons (1997) concluded that the images held by these black female students reflected science instruction which highlights the values of dominant culture in the U.S. She critiqued the heavy reliance on written tests rather than oral communication in U.S. science classes, and the emphasis on the ‘one right answer’. Carlton Parsons (1997) argued that:

‘To portray science as a human enterprise inclusive and tolerant of the black culture, instruction must emphasise the processes underlying the formation of scientific knowledge. Instruction must include discussions and simulations of science as an enterprise convoluted by human interaction, as shown by the constant exchange of information; by human interpretation as evident in the definition of the problem and the assignment of meaning to data; and by human interest, whether it be individual, national or global.’ (p.265)

### SUMMARY OF RESEARCH — SCIENCE EDUCATION WITHIN SOCIETY

While Pacific girls have been observed to work very hard at school, and have high motivation, there can be a profound mismatch between the approaches to learning of Pacific girls from working class families and those that the school culture rewards.

Teachers and Pacific girls/students need to work together to make explicit their understandings about the nature of learning, and to negotiate effective pedagogies that link new curricula content to the experiences of Pacific girls/students. Comparable research is not available on the experiences of Pacific boys.

The economic position of students and their families is deeply implicated in their understandings about education, and the cultural resources students and teachers bring to education.

Teachers can support students in developing metacognitive strategies and can work with students to negotiate shared understandings about learning, but teachers cannot simply produce economic, social and educational equality.

US research indicates that gender and ethnicity interact in complex ways in the construction of understandings of science and the positionings associated with scientist.

Teachers need to challenge the notion of science and its framing of human history as they develop pedagogical approaches that make science meaningful to students of different cultural and ethnic heritages.

The most significant body of research into science education in New Zealand has been the series of studies carried out in the Centre for Science and Mathematics Education Research (formerly the Science Education Unit) at the University of Waikato. Preceding the focus decade of this review, there had been the Learning in Science Project [Form 1–4 (Years 7–10)] (Tasker, Freyberg & Osborne, 1982) and the Learning and Science Project (Primary) (Osborne & Biddulph, 1985). At the outset of the decade, the Learning in Science (Energy) [1985–1988] project had just been completed (Kirkwood & Carr, 1988). These research programmes identified a range of difficulties confronting the diversity of New Zealand students in school science education, and generated a model of student learning in science.

A major outcome of these studies was the documentation of the kinds of experiences and knowledges New Zealand children brought to their science learning (for example, about energy, floating and sinking, plant nutrition and electric current). Further, the programme generated a pedagogical approach that had the potential to enable the teacher to address the five key points identified by Baker (1994).
The interactive teaching approach developed by Biddulph and Osborne (1984) required teachers to begin the pedagogical process by identifying the children’s understandings and questions. The interactive teaching approach positioned children as active seekers of answers to their own questions – as scientists. The roles of the teacher were to help children select questions for investigation, guide children’s explorations, reflections and reporting on their learning, and facilitate a shared evaluation of the investigations. An important aspect of the approach from a gender perspective was the teacher’s responsibility to value children’s ideas and to encourage safe and responsible participation by children. Working as a teacher educator Biddulph (1989) concluded that:

‘Since the approach differed markedly in perspective in science, learning and teaching from that held by most teachers, few could adapt it as intended by the developers without the experience of a special in-service programme.’ (p.ii)

Accordingly, Biddulph (1989) worked with teachers doing action research, using the interactive teaching approach in 48 primary classrooms across age levels. The approach was taken up also by researchers and teachers in Australia. Biddulph (1989) noted Australian teacher researchers Spyrou and Hattam’s (1986) finding that ‘the girls were just as successful, inventive and eager to participate as the boys when the interactive teaching approach was adopted’ (p.235). While the approach has the potential to enable teachers to address gender and diversity in their pedagogy, whether or not the approach is influencing New Zealand teachers to be responsive to girls and boys in classroom practice remains a question. Biddulph (1999) suggested that the approach may be being used less in recent years since recent changes in New Zealand primary teacher education. Biddulph (1989) also emphasised that:

‘Māori and Pacific Islands children need to have their questions considered in the classroom if they are to investigate culturally significant aspects of their natural world.’ (p.40)

Using the interactive teaching approach and the thinking book pedagogy (Swan & White, 1993), Imo (1996) investigated the kinds of questions asked by students studying a unit on ‘Water — the phenomena’ in her own class. Imo focused on four case study Year 8 Samoan girls. Imo (1996) conducted a group conference with the girls. These students said that they did not openly ask questions in class because they ‘were afraid of being ‘put down’ constantly by their Samoan male peers, either verbally or through subtle innuendoes in these boys’ actions’. (p.5) There were four Samoan girls and 11 Samoan boys within the multicultural intermediate class of 33 students.

Because the case study girls reported that their anxiety was related to the behaviour of the Samoan boys specifically, Imo reflected that her research raised a question about Samoan gender relations. This finding had not been anticipated by Imo. She expressed concern that in intervening to encourage the girls to ask more questions without addressing the behaviour of the boys, she might be disregarding her responsibility to protect the ‘mauri’ of the girls. Imo found that the girls were able to ask ‘good’ scientific questions, but chose to select ‘safe’ questions already included in the science resources provided by the teacher. Imo reproached herself for implicit messages that perhaps the teacher’s or text’s questions are the ‘right’ and ‘safe’ options. However, she found, by interviewing the case study students, that the question-asking task enabled them to link their new learning to their own prior knowledge.

McComish (1993) argued that issues of gender in science education are not naturally addressed through pedagogies arising out of the development of constructivism in mainstream science education research. She stated that ‘the conceptual change model, valuable though it is, confers no particular benefit on girls’ because such understandings do not ‘help to unsettle the basic categories of science and its relationship with our society. (p.57)
Gilbert (1997) argued for the use of deconstruction as a basis for the teaching and learning of science in secondary schools. Gilbert’s poststructural argument draws upon Butler’s (1990) conceiving ‘of sex/gender, not as an essential attribute of individuals, but as the effect of various social practices, an effect that does not precede these practices, but which is discursively produced by them’ (p.64). She contends that the inherent masculine construction of science requires ‘both women and men to behave as if they have split off … those aspects of themselves which are constructed as being ‘feminine’ … and to leave unacknowledged the connections between these aspects of themselves and the more cognitive, rational aspects.’ (p.68).

Gilbert (1997) argued that deconstruction as a pedagogical approach offers a way to produce students ‘who not only have a good understanding of the conceptual basis of science but who are also able to transgress its boundaries … to be its innovators and critics’ (p.77). Kenway and Gough (1998) note that internationally, the use of poststructuralist methodologies and concepts in ‘arguments that the curriculum is not academically, politically or culturally neutral … are only just starting to enter science education discourses (eg, Brickhouse, 1994; Hildebrand, 1996), despite their popularity in much other feminist work in education since the late 1980s’ (p.7).

### SUMMARY: PEDAGOGICAL IMPLICATIONS OF RESEARCH ON SCIENCE EDUCATION

The Interactive Teaching Approach is a pedagogical approach that enables students to position themselves as scientists.

The Interactive Teaching Approach has been found to support students’ science learning.

The Interactive Teaching Approach enables diverse students to link new learning to their own experiences.

The Interactive Teaching Approach provides a pedagogical strategy to scaffold students to generate questions. Question asking has been linked to student learning and achievement outcomes in science.

The Interactive Teaching Approach requires teachers to attend to gendered processes to ensure that students feel safe to participate in science.

The Interactive Teaching Approach enables Pacific and Māori students to generate and investigate their own questions in science. This strategy draws upon the diversity of students as a resource to support science teaching and learning.

A study of Samoan girls’ use of the interactive teaching approach revealed that they preferred to use questions from texts or the teacher’s questions to their own questions. These girls’ anxiety was partially linked to their anxiety about being teased by Samoan boys. Their teacher concluded that she may have given an implicit message about the right questions and reflected upon the need to think further on hidden gendered and cultural processes.

A critique of the interactive teaching approach has been that it does not sufficiently unsettle science and its relationship with society. The inherent masculine construction of science may influence both males and females to distance themselves from the feminine.

Post-structuralist theory provides a tool for teachers and students to enable them to deconstruct the gendered representational systems, language forms and binaries or dualisms that shape gendered experience.

Within a larger study of the impact on students of an integrated social studies and science unit designed to implement gender-inclusive curriculum Alton-Lee, McBride, Greenslade and Nuthall (1997) focused on the strategy of using a woman scientist as a role model for intermediate students. Through integrating science and social studies curriculum, teachers can explicitly address issues of
gender and positioning in science. In this study, the teachers’ concern was to assist students to see possibilities for themselves in participating as scientists in the future.

Alton-Lee, McBride, Greenslade and Nuthall (1997) explored the impact on case study students of the implicit use of the visit, and involvement of a female scientist in a unit focused on Antarctica. The shared purpose of the teachers and researchers was to explore the impact of student exposure to a woman scientist on both boys and girls. Margaret Clark’s identity as woman was not featured with the students, because the teachers wanted her presence to be a given as scientist and field leader, not classified as an exception as woman scientist.

The authors used a discursive analysis of male and female positionings in curriculum to argue for a multiple positionings approach to enable students to gain a more complex understanding of both male and female role models. Evidence from interviews, letters written by the students, and changes in pre and post test responses, indicated that geologist Margaret Clark’s influence was considerable across the class. High achieving Pakeha male student, Paul, was strongly influenced by her contribution. His expressed preference for a future Antarctic role for himself before the unit was as explorer ‘because it is exciting’, but his expressed preference after the unit was geologist.

Paul: ‘Ah, researching. Researching round all the places and that ‘cause they go along and they research about how old the ice is and all the rocks and see what it’s supposed to be joined up with.

Interviewer: What would be your favourite research topic?

Paul: Probably geology. (p.29)’

A shift in preference was also apparent for the Samoan case study student, Teine. Before the unit, she had been interested in studying whales and seals. After the unit Teine reported that she ‘wondered how glaciers had been formed like they are’, and wanted to study glaciers. The authors linked this change to the opportunity the class had to hear an illustrated talk by Margaret Clark about her role in leading a field expedition to map Trans-Antarctic mountain ranges. Glaciers were mentioned by the scientist on six occasions and illustrated with slides she took. This finding is reinforced by a large scale investigation of a role model effect by Evans, Whigham and Wang (1995).

Evans, Whigham and Wang (1995) found that a three day role model intervention which involved a project leader and two female university student role models doing agricultural and engineering science programmes led to positive attitudinal outcomes for both girls and boys within a sample of 964 ninth graders in Iowa. After the intervention, girls’ scores on liking science, wanting their achievement in science recognised, perceiving the usefulness of science, and understanding the work of scientists, were significantly higher than on their pre-tests scores or in comparison with those of a control group. Boys’ scores were significantly higher for liking science, the usefulness of science and understanding the work of scientists. The larger changes for girls were linked by the researchers to their more negative initial attitudes. Evans, Whigham and Wang (1995) concluded that their intervention was effective in changing the attitudes of their target population — girls — and in reinforcing boys’ more positive attitudes.

The evidence from Evans, Whigham and Wang’s (1995) study shows similarly positive outcomes for both girls and boys in using women scientists as role models in science. However, Alton-Lee, McBride, Greenslade and Nuthall (1997) argued that an additive strategy where female role models are added to the ‘normal’ curriculum is problematic, because such a strategy continues a discursive positioning of women as exception, and male as norm, in science and within the ongoing science curriculum. They argued that the implicit inclusion of women examples in everyday curriculum...
enables girls and boys to value the contribution of women, and expands the possibilities they might envision for themselves as future scientists.

**SUMMARY: PEDAGOGICAL IMPLICATIONS OF RESEARCH ON SCIENCE EDUCATION**

The use of integrated science and social studies curriculum enables teachers explicitly to address issues of gender and positioning in science.

An effective strategy that influenced intermediate students to position themselves as scientists in the future involved the implicit use of a (woman) scientist as an informant. By not making explicit her gender, the teacher presented the scientist as the norm, not the exception.

The implicit use of a (woman) geologist as informant influenced both girls and boys to desire to be a geologist carrying out exploratory work.

The curricula intervention of the implicit use of a (woman) scientist as an informant had another effect in influencing students to respect, and value the opportunity to learn from, a (woman) scientist.

Actual scientists as role models and informants have measurable effects on students’ attitudes towards science and positionings as scientists, regardless of whether the scientists are integrated into the ongoing programme or featured as an additive dimension to the science programme. Research has shown the use of women scientists to have a positive impact on both girls and boys.

Further research is needed on effective use of role models, and the long-term effects of different approaches to involving role models in school and class programmes.

**4.10 ASSESSMENT**

There are apparent contradictions in: (a) the contrast between boys’ higher performance on NEMP science tasks at Year 4 and girls’ slightly higher mean achievement on TIMSS at this level, and (b) girls’ higher mean scores on secondary science assessments than boys, but for Years 12 and 13 students, lower mean achievement on the TIMSS science literacy measures.

One possible factor influencing these outcomes could be gender influences in the assessment procedures in the nature of the assessment used. For example, one hypothesis could have been that, given girls’ greater proficiency with literacy skills, on average, boys may have performed more poorly on the open-ended questions in the TIMSS science assessments at Years 5 and 9. Gender differences favoured girls at Year 5 on these measures and boys at Year 9. Chamberlain, Chamberlain and Garden (1998) concluded that the marked gender differences that did occur were ‘more likely to be related to subject matter, content, and motivational factors than item type per se’ (p.172). At the Year 5 level, girls did significantly better on average on the life science items. The biggest gender difference in favour of girls occurred for an item asking students to identify the ways in which animals protect themselves. At the Year 9 level, where about 60 percent of the items produced significant gender differences, boys did better, on average, on earth sciences, physics and chemistry items. One of the largest differences in favour of boys occurred on an earth science item testing understanding about rain within the hydrologic cycle.

In their study of the use of modular units for teaching science at Year 10 level, Bird and Willis (1994) found that there appeared to be gender bias in the scaling of assessments after moderation. They reported that girls’ marks were scaled down more than boys’ marks, and the greatest downward effect occurred for girls taking only one science subject. However, they also reported that the process of scaling was damaging for the motivation of both girls and boys in their study, and undermined the positive features of a modular curriculum approach.
In the absence of New Zealand research on Māori and science, apart from the TIMSS studies, McKinley (1999) points out that Lomax, West, Harmon, Viator and Madaus’s (1995) evaluation in the USA of six of the most widely used test batteries in mathematics and science found negative impacts on minority students. In science, the quality of instruction for minority students, the quality of teaching practice, and achievement of minority students were found to be adversely affected by the inadequacies of such tests for addressing higher order thinking and high level conceptual or procedural knowledge. The use of testing as a development strategy was found to be counterproductive to minority student learning.

**SUMMARY OF ASSESSMENT**

Gendered assessment effects can occur because of the impact of subject matter content and motivational factors that are influenced by gender.

One study found marked gender bias favouring boys in the scaling of scores in a modular curriculum approach.

Standardised testing programmes have been found to have adverse effects of the learning of minority students in science.

### 4.11 MASCULINITIES, FEMININITIES AND STUDENTS IN SCIENCE EDUCATION

In science education internationally, a major critique of research on gender has been the approach that is based upon implicit assumptions about the deficit of girlhood. For example, Kenway and Gough (1998) explain:

> 'When the focus is on the girl, it has been commonly said that she lacks the appropriate aptitudes, attitudes, experience and knowledge. She is said to be deficient because she lacks confidence, and does not usually bring to school science a history of experience which facilitates her interest, active participation and success. Neither does she possess the 'cognitive style’ ... she makes the wrong subject and career choices.' (p.6)

The implicit assumption of the deficit of girlhood has not been a feature of the research reviewed. Rather, the curriculum, texts, teacher’s understandings, discourses, pedagogies and the learning environment have been more the focus of New Zealand research in gender and science education over the past decade. However, the Education Review Office (1995) ‘Barriers to Learning’ report based on data from 272 New Zealand primary and secondary schools suggests that an implicit discourse of the deficit of girlhood is a widespread feature of educational practice.

What is apparent in the New Zealand research on gender and science over the past decade is the near total silence regarding boys and masculinities in the context of science education. Boys have almost ubiquitously been subsumed under the category of ‘students’, or considered in the context of concerns about girls and science. Given that many of the problems reported and observed to be encountered by girls (and boys) in science classes arise from the behaviour of (some) boys, the lack of research problematising and investigating the behaviour of boys in science education is surprising.

While there has been evident marked gender bias in western European masculinist images of science and scientists in school texts, there has been an absence of research investigating how such male bias, and the masculinist construction of science curriculum, influence boys. In particular, there is an absence of such work investigating the impact of the ways in which school science constructs particular forms of masculinity on Māori boys, Pacific boys and boys of other ethnic identities. With the exception of work by Town (1998) and Gilbert (1996), there seems to be little research
investigating or questioning the impact on boys of particular portrayals of masculinity implicit within science curriculum.

Research on the ways in which boys experience and perceive traditionally masculine and feminine subjects, such as that by Australian researcher, Martino (1996), illuminate the costs ‘of hegemonic masculinity for girls and boys in schools’ (p.124). In their review of recent international research on gender and science, Kenway and Gough (1998) argue that:

‘boys too can benefit from the humanising of what, for them, are regarded as traditional fields of knowledge. But it also means that they should not be encouraged by prevailing ideologies of masculinity or work opportunities to avoid those school subjects which seek to develop their important human capacity to be sensitive, imaginative, responsive, empathetic, sympathetic, creative and perceptive.’ (p.23)

**SUMMARY OF MASCULINITIES, FEMININITIES AND STUDENTS IN SCIENCE EDUCATION**

- Deficit perspectives that led educators to focus on changing girls in the 1970s were not evident in the research reviewed during the 1989–1999 decade.
- Evidence exists that deficit perspectives are endemic among teachers.
- There has been an absence of research on how the impact of the masculinist construction of science affects boys in general.
- There has been an absence of research investigating the experiences of Pacific and Māori boys in science education.

**4.12 PARTICIPATION AND ACHIEVEMENT IN SCIENCE EDUCATION IN SINGLE-SEX AND CO-EDUCATIONAL SCHOOLS**

Sturrock (1993) differentiated student achievement and participation in secondary science by school type. The data for the 1990 School Certificate cohort showed a markedly higher rate of participation in science for girls at single-sex schools and a slightly higher participation rate for boys in co-educational schools. Both girls and boys at single-sex schools achieved slightly more highly than those at co-educational schools. However, the confounding effect of the likely higher social class demographics of the single-sex school populations is more likely to explain these differential achievement results than the sex of the student body.

For the Sixth Form Certificate cohort in 1990, Sturrock (1993) found higher participation rates for girls in biology, chemistry and particularly physics at single-sex schools. Boys at single-sex schools were more likely to do biology, but less likely to do physics, than their counterparts at co-educational schools. The 6th form attainment of both boys and girls at single-sex schools was higher than that of both groups at co-educational schools. Again, the social class composition of the schools is likely to have been the stronger explanatory factor than the sex of the student body. Sturrock’s (1993) analysis of participation and attainment at the 7th form or Year 13 level for the 1990 cohort mirrors the results for 6th form.

Nash and Harker (1994) reported that the mean science scores in their analysis at the end of Year 10 were 43.8 for girls in single sex girls’ schools and 41.7 for girls in co-educational schools. The difference was smaller for boys: 43.6 percent mean for boys in single-sex boys’ schools and 41.3 percent mean for boys in co-educational schools. Nash and Harker concluded:
'In science, the difference is due in part to the ability differences of the pupils, but a significant difference remains in favour of single-sex schools...the 'school effect' is only observable for girls, with the boys showing no difference when initial ability is taken into account.' (p.25)

However, in stage two of their study of over 5000 pupils in 37 secondary schools, Nash and Harker (1997) amended their earlier view. Nash and Harker (1997) concluded that the initial statistically significant differences in achievement between students in co-educational and single-sex schools disappeared for English, mathematics and science — after their analyses controlled the data for different initial ability levels and the social and ethnic mix of schools.

Nash (1999) commented that within one study, a high achieving female student was denied admission to the single-sex school of her choice. After she demonstrated a high level of achievement at a coeducational school, she was then given a place — at senior level — in the single-sex school. At that same time, two girls who had been suspended from the single-sex girls school went to the girl’s former school. In this way, market policies can lead to the achievement effects being wrongly attributed as an effect, rather than a pre-condition, of school attendance.

Recent international research does not support arguments for single-sex schooling as a strategy for either boys or girls in science specifically. For example, McEwen, Knipe and Gallagher (1997) carried out an analysis in Northern Ireland of the impact of single-sex and coeducational schooling in Northern Ireland on the participation and achievement of 1600 students in science. They found that boys and girls were more likely to take A-level science subjects in co-educational schools and boys, in particular, were more likely to achieve high attainment in co-educational schools.

Through focus group interviews, they deduced that girls’ improved expectations of employment prospects were a stronger factor than school type or curriculum in the increased participation of girls in science over the 1985–1995 decade. McEwen, Knipe and Gallagher (1997) concluded: ‘There appear to be no grounds from the present results for either separate schooling for boys and girls or single-sex setting in coeducational schools as a means to encourage greater participation by girls in science.’ (p.223)

It is likely, however, that the particular cultural and resource characteristics of single-sex schooling in each society influence students in particular ways. For example, McEwen, Knipe and Gallagher (1997) found that, unlike the case for girls in single-sex schools whose overall average achievement in science at A level rose during the 1985 to 1995 decade, for girls in Irish Catholic single-sex schools, this pattern was not evident.

Recent New Zealand research provides contradictory findings about differential effects in achievement by school type. In 1998, the Education Review Office conducted an analysis of girls’ and boys’ overall school certificate achievement at B grade or better, by school type and decile level (ERO 1999). The ERO findings show a strong pattern of greater achievement for single-sex schooling for both girls and boys within decile levels, except for boys at the lowest decile levels. Either there is a slight positive effect in science achievement for girls in New Zealand single-sex schools or other effects associated with social class and ethnic mix are embedded in an apparent but misleading school-type effect.
SUMMARY OF PARTICIPATION AND ACHIEVEMENT IN SCIENCE EDUCATION IN SINGLE-SEX AND CO-EDUCATIONAL SCHOOLS

The statistics showing higher performance for males and females in single-sex schools are frequently confounded by the higher socio-economic level of school populations in those schools.

Girls in single sex schools in New Zealand have participated in science at higher rates. This statistic also may be somewhat confounded by the higher socio-economic level of school populations in those schools.

Nash and Harker (1997), in a study of 37 secondary schools, found apparent advantages for student achievement gains in single sex schools to disappear after they controlled data for initial student ability, and social and ethnic school mix.

School choice and market policies can belie untenable assumptions about what is causing higher achievement in a market where students are changing schools.

The Education Review Office has found a strong pattern of greater achievement for single-sex schooling for both boys and girls within decile levels, except for boys at the lowest decile levels.

The contradictory findings about single sex schools in the New Zealand context during the 1989-1999 decade suggest that, either there is a slight effect for girls’ single sex schools in particular for science performance, or other effects such as social class and ethnic mix, are embedded within an apparent but misleading school effect.

Single sex girls’ schools have been advocated for their provision of an environment where gender-based harassment is less prevalent, but have also been criticised for ill-preparing girls for the masculinist culture of tertiary science.

A Northern Ireland longitudinal study of students’ performance in science in single sex schools found no effects by either participation or achievement to arise out of separate schooling for boys and girls.

4.13 SINGLE-SEX CLASSES

In New Zealand the single-sex class strategy has been the subject of media attention from time to time but, there have been few empirical studies evaluating the effectiveness of the strategy. Scott (1992) carried out an exploratory study in this country of the impact of a fifth-form only girls science class in a multi-ethnic co-educational secondary school during 1988. Her rationale was to solve some of the problems identified in Australian and British research as experienced by girls in science classes, such as classroom interaction patterns favouring boys, unsupportive classroom atmosphere, sexual harassment and denigration by boys [Gardner, 1985; Kelly, 1982; Pummeroy & Haynes, 1986; Rundle, 1985; Spender, 1982, and Wilson & John, 1985 cited in Scott (1992)]. Both boys and girls in the school were given an option to go into a single sex class. Although 27 girls opted for a single-sex class only four boys were interested in a single-sex option and the boys-only class did not proceed. Scott’s account suggests that the single-sex class was predominantly an option sought by Pakeha girls — no Māori girls, one Pacific and one Cambodian girl elected the single sex option, but the co-educational class had ‘a wide representation from other ethnic groups’ (p.33).

Scott focused her comparison on the single-sex class and a co-education class taught by the same teacher. Over 10 hours of observation in the co-education class, Scott found boys ‘to dominate the classroom interactions and practical work. In every such observation, it was found that boys more than girls called out, raised their hands and called the teacher over’ (p.38). Scott (1992) reported the girls in the girls-only class to be livelier and less inhibited in their participation than their counterparts in the co-educational class. The girls in the single-sex class perceived the intervention to have made a difference:
'It's made a lot of difference to science for me, 'cause now I'm more confident about approaching it. I know I can do it without the boys putting me down all the time. Um just mainly a lot more confident.' (Anna)

'A lot of people are more confident 'cause you can tell sort of people who are really quiet — they're answering questions and things and it's just sort of worked well in that way — sort of bring everyone out of their shell.' (Jessica)

'The girls I sat with — we would have these tremendous arguments about the science.' (Carolyn).

A prevalent view amongst girls in the co-educational class was that the boys were better at science than girls. Scott found that 14 out of the 20 girls interviewed reported the behaviour of boys to have been upsetting and inhibiting to them. The girls reported boys to be putting girls down in verbal comments, distracting, naughty, ridiculing of girls, and to be receiving more help from teachers. However, the girls in the co-educational group for this study reported their male counterparts in the co-educational class to be much less troublesome than in other co-educational classes.

Because the girls opted for their class type, Scott’s (1992) study design did not allow a direct comparison of achievement and she concluded that the experience did not influence girls’ subject selection in 6th form. The focus teacher found the co-educational class ‘really wonderful’, and found it challenging to channel the unusually bubbly and enthusiastic behaviour of the girls in the girls-only class. She reported that she found no obvious conclusion from the comparison of teaching the two classes.

The HOD science in Scott’s (1992) study was supportive of the single-sex intervention. However, both the HOD science and other fifth form teachers found the reduced ratio of girls in other science classes to be a concern. Scott characterised this unintended effect as unfortunate, and raised a question about this feedback as evidence of the ‘civilising influence society expects girls to exert on their male peers.’ p.43. Byrne (1993) argued an alternate view: that boys’ classroom behaviour ‘is a reason for improved classroom management to control boys’ discourse, not a reason for segregating girls’ (p.10). Byrne (1993), on the basis of the UQ WISTA Australian research, based on data and evidence from interviews in ten of Australia’s largest Universities and Institute of Technology, suggested that single sex segregation has longer term implications for girls’ participation in tertiary science. She reported that in much field evidence, the female dropout rate in first year University science and technology is partly due to:

‘their inability to adjust to the dominant and crude culture of males who have not yet had to see girls as ‘naturally’ competing with them, and either exclude female students from discourse, or refuse to work collaboratively with them on practical work, or refuse them computer time, or harass and mock them, or designate them as unfeminine, thus seriously threatening their identity in late adolescence.’ (p.10)

Evans, Whigham and Wang (1995) compared a single-sex and a coeducational option for girls within a sample of 964 Iowa girls and boys in 57 ninth-grade science classes. The focus of their study was a three day intervention using women as role models for occupations in science and mathematics. Although the intervention showed strong significant positive effects for girls and boys, there were no significant differences in attitudes between girls in the single sex and girls in the coeducational classes — contrary to the researchers’ initial hypothesis. Further, as with Scott’s study, pulling the girls out of coeducational classes created problems for the teachers who had to arrange alternative activities for
the boys. The girls were resentful that they had missed out on the boys’ activity — ice-cream making — which they perceived to have been more fun.

At the time of the review, there was no available study of a single-sex intervention for boys in science within a coeducational school in New Zealand.

**SUMMARY OF RESEARCH ON SINGLE-SEX CLASSES**

Girls but not boys opted into a single sex class option within New Zealand secondary school. Mostly Pakeha girls selected this option.

Girls in a single-sex class intervention participated more actively and noisily in class and perceived themselves to be much more confident.

Girls in the school where the single sex intervention occurred perceived boys to be putting them down, upsetting and inhibiting them in class.

After the single sex class intervention occurred, teachers reported difficulties with organisational arrangements and boys’ behaviour for the remainder of science classes.

Reports of organisational difficulties and student resentment from both boys and girls tend to be associated with single sex interventions in coeducational secondary schools.

In the USA, the impact of a female role model intervention in single sex and coeducational class conditions in science showed the single sex and coeducational conditions to make no difference to the positive effect of the women scientists and engineers on both girls and boys.

A teacher preferred teaching a coeducational class to a single sex class, and found the girls’ boisterous and outspoken behaviour in the single-sex condition challenging.

Australian research suggests girls need to be prepared to cope with the dominant and crude culture of males in tertiary science in order to succeed in tertiary science education.

### 4.14 TEACHERS, TEACHER EDUCATION, RESEARCH AND GENDER IN SCIENCE EDUCATION

International research has increasingly shown that issues of gender and ethnicity need to be integrated throughout pre-service and in-service teacher education. Further, they need to be developed to ensure there is follow-through to classroom practice in making the links between theory and practice (Blasi, 1996, Bullock, 1997; Shah, 1989). Bullock (1997) found that a *Gender and Ethnic Equity in Science Education* programme for pre-service teachers in the U.S. was useful in providing specific critical techniques; but the inappropriate placement of the programme as an add-on at the end of their professional training left pre-service teachers shocked as they confronted the realities of the intersections of poverty, ethnicity and gendered regimes influencing students lives. As Bullock (1997) concluded:

> 'a regard for equity is not an ornament on a teacher training programme, but the tree itself.' (p.1033)

Throughout this chapter, it has been evident that the role of the teacher is critical in responding to the substantial gender issues within the nature of science curriculum, student participation and enacted curriculum. Nevertheless, the professional development supports that enable teachers effectively to address issues of science, gender and inclusive practice are often left implicit. In this section we consider a range of factors arising, or not emerging, out of the literature. What has been evident is the value of classroom research and action research with diverse learners in specific cultural contexts of real classrooms and learners.
However, as has been foreshadowed in Chapter Three, almost none of the teacher education contexts that enabled the specific research reported in this chapter to be carried out remain after the change to a market model in teacher education, and the introduction of shortened courses in primary pre-service training. Further, pre-service teachers are likely to be gaining less access to subject matter knowledge in their training.

While the development of the Interactive Teaching Approach at the University of Waikato (Biddulph & Osborne, 1984) was seen by a range of educators (for example, Biddulph, 1990; Kirkwood, Symington, Taylor & Weiskopf, 1995; Symington & Hayes, 1989) to enable teachers with less pre-service disciplinary study in science to develop their own scientific knowledge as they taught, Biddulph (1999) and Biddulph and Carr (1992) contend that current contexts of primary pre-service training do not provide sufficient time to facilitate this alternative, pragmatic approach to teacher education.

Kirkwood’s multiple studies in this area were predominantly carried out in the Australian rather than the New Zealand context although they were founded upon her doctoral work in New Zealand (Kirkwood, 1988). Recent changes in teacher education have disestablished the courses which provided the context, for her collaborative work with pre-service and in-service teachers in this area and accordingly, this research programme has been discontinued. (Kirkwood, 1989; Kirkwood, 1991; Kirkwood & Symington, 1995; Kirkwood, Symington, Taylor, & Weiskopf, 1995).

The national analyses of the international research comparisons in science have not included a specific focus on issues of gender linked to teachers. However, the issues of primary and intermediate teachers’ lack of confidence in science curriculum teaching pervades the data that is available. McKinley (1999) has also highlighted the issues of teacher knowledge and use of Māori language that are critical to the effective provision of the Māori science curriculum for Māori girls and boys.

According to findings from TIMSS just over one quarter of New Zealand middle primary teachers that taught science had a Bachelors degree or Masters degree in education, with teacher training. Overall, 28 percent of the teachers were male. There was no question identifying specific subject-related qualifications of primary teachers in science. However, Chamberlain G., (1997b) cited Clark and Vere-Jones’s (1987) argument that the extent of science knowledge of New Zealand primary teachers is of concern.

TIMSS did not seek information specifically about science qualifications of teachers, but at the lower secondary level, a significant positive relationship was evident between teachers with higher qualifications and higher student achievement (Chamberlain, G., 1996). A similar, weaker relationship was evident for teachers at the Year 8 level. There were dramatic differences between the final year primary or intermediate and the first year secondary teachers in the sample in their confidence to teach science. Whereas the secondary teachers were confident to teach all nine sub-topics specified, the primary/intermediate teachers did not rate themselves confident to teach six of the nine topics.

There were significant relationships between Year 8 students’ achievement on different sub-topics and their teachers’ confidence to teach. However, teacher confidence to teach did not appear to reduce gender disparity. For example, earth science, for which there were marked gender differences in favour of boys, was one area where Year 8 teachers did feel confident about their preparation to teach.

In summary, where there are data on teacher qualifications in and confidence to teach science, the TIMSS analyses do suggest that there is a relationship to student achievement. But this relationship does not seem to explain gender discrepancies at the primary, middle school or secondary level.

There were no questions reported in TIMSS at any level which addressed teacher’s reports of understanding of gender or other equity issues, or having participated in pre-service or in-service
education about gender issues. The TIMSS report for Years 4 and 5 science achievement revealed that New Zealand teachers were likely to be familiar with the new national science curriculum document, but that no national guides focused on pedagogy were available at this level (Chamberlain, G., 1997b).

A further concern evident throughout the New Zealand research literature and commentary has been the translation of research that is available within New Zealand into educational practice. Bell, Kirkwood and Pearson (1990) reported that ‘a growing concern throughout the nine years of (the LISP) research has been the limited impact of the research findings on teachers’ and students’ activities in classrooms, despite evaluations indicating the effectiveness of the new approaches.’ (p.4).

Kirkwood (1989) and Kirkwood, Elliot, Graham and Houston (1990) reported on a year long in-service professional development course on the interactive teaching approach (Biddulph & Osborne, 1984). This research and development programme specifically included focus sessions on gender issues, and provided an ongoing professional network for male and female teachers. The design of the project built on the work of the Australian ‘Women and Science Teacher Education Project’, which provided evidence that ‘linking work in science with explicit treatment of gender issues in in-service programs can affect the attitude to science of women primary teachers, and the attitudes of the girls they teach’ (Kirkwood, 1989, p.21).

The teacher participants reported initial difficulty in changing their focus from their teaching to student learning. However, case study reports from teacher participants suggested that the sustained professional development enabled them to effect fundamental changes in their own teaching approaches, which in turn influenced students. They reported that students asked many more scientific questions, actively learned to investigate their questions, and developed independent learning and reflection skills.

A survey of the impact of the project found that changes in the teachers’ class programmes were facilitated by: the atmosphere of the workshops, and the participants’ own changed attitudes to science; the ‘hands-on’ approach to technology; and the involvement of learners in determining their own learning. Specific pedagogical strategies such as concept maps, reflective thinking through diary and report-back formats, group work and modelling, were identified as instrumental to the translation of the in-service experience to classroom practice. Although the programme was based in Kirkwood’s own work in the LISP energy project at the University of Waikato, the actual professional development programme was offered not in New Zealand, but in Australia from the Canberra College of Advanced Education School of Education.

The success of Kirkwood’s (1989) approach is consistent with the findings Kahle and Rennie (1993) reported on the use of teacher in-service workshops combined with activity-based science lessons. The interventions were carried out both in the U.S., with 23 4th and 5th grade teachers, and Australia, with 18 5th grade teachers and a control group. However, the Kahle and Rennie (1993) study involved a much shorter in-service intervention with teachers. The focus teachers received a 2-day in-service workshop, designed to enhance their ability to teach electricity in a gender-equitable way, while the control group received an in-science workshop focused only on the science skills for one half day.

The U.S. study extended the design by using a science skills group, a science skills and equitable teaching strategies group, and an equitable teaching methods condition only. Each occupied one and a half days. The interventions were evaluated using questionnaires before and after a unit on the topic of electricity, with the students subsequently taught by these teachers. The findings showed that for both countries, gender differences disappeared for students whose teachers had participated in the skills/equity and equity groups, and received training about the importance of active participation for both girls and boys. In classes whose teachers had only equity and not skills training, girls reported they found the science experiences more difficult. The results of both studies showed that equity
training, combined with hands-on activities, can raise girls’ enjoyment of and confidence in physical science to such a level that it becomes equal to the more positive attitudes of boys.

For Kahle and Rennie (1993), the effects of the in-service intervention were judged for students during one subsequent topic studied on light. Kirkwood (1989) and Kirkwood, Elliot, Graham and Houston (1990) claimed changes in teaching practice that were more far-reaching. The evidence from these studies suggests in-service teacher education can support equitable experiences for students in classroom practice in science. The disparity between the length of the intervention with teachers in these studies raises questions about the relative effectiveness of interventions of different lengths, and the ongoing influence of the professional networks established by Kirkwood. However, questions about what models might be more effective are undermined somewhat by the larger question of what infrastructures are available to support such models in pre-service and in-service teacher education in New Zealand.

The centrality of research in such infrastructures is a major concern when research and tertiary teaching are increasingly being separated within higher education and teacher education. McKinley (1999) calls for a central core of Māori education that should be “a “research-based” body of knowledge on Māori achievement and learning” (p.25).

McKinley (1999) summarises the kind of research based knowledge that is needed for development in Māori science education:

(a) effective school findings, including school structures and how they affect Māori students, particularly Māori student’s learning

(b) effective learning and teaching which includes: teaching and learning styles; the cultural dimensions of learning and motivation; social and cultural factors that inhibit or advance learning; the effects of role models and mentors on Māori students; exceptional and gifted Māori students

(c) language acquisition, particularly for immersion and bilingual education

(f) Māori and science-specific learning

(g) cross-cultural interpersonal relationships

(h) policy research related to Māori

(i) curriculum and Māori (p.25).

McKinley claims that if such research were available ‘teachers would be exposed to this research through their teacher education and science educators could help student teachers to apply these findings to their science teaching’ (p.25). Implicit within McKinley’s claims (1999) are a hopeful assumption about the translation of research into practice.

Given historical issues in the translation of research about Māori education into educational practice, it may be timely to ensure that there are established also mechanisms for monitoring the links between research, teacher education and teacher action in classrooms. McKinley (1999) has provided a proposed programme of research as a platform for development in science education for Māori boys and girls whom this review reveal to be a priority in this curricula area. McKinley’s conclusion could be applied to other groups of girls and boys in New Zealand society:

‘If we are to move to a more knowledge based society such as the recent Five Steps Ahead programme suggests, we cannot afford to have Māori students not
Explain and Addressing Gender Differences

participate in science, for both the diversity they can bring and the contribution they have the potential to make.’ (p.27)

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<tr>
<th>SUMMARY OF TEACHERS, TEACHER EDUCATION, RESEARCH AND GENDER IN SCIENCE EDUCATION</th>
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<tbody>
<tr>
<td>In science education, ‘a regard for equity is not an ornament on a teacher training programme, but the tree itself’ (Bullock, 1997, p.1033)</td>
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<tr>
<td>The teacher’s science knowledge, understandings of gendered and cultural processes, and pedagogical practice are critical to effective and inclusive science education.</td>
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<td>The interactive teaching approach provided a methodology to assist teachers to deepen their own knowledges.</td>
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<td>Action research enables teachers to identify processes at work in the particular cultural contexts of their classes, to trial and evaluate responsive pedagogies.</td>
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<td>Current New Zealand policies in primary, and to some extent in secondary education have led to less subject matter preparation for teachers and less involvement in research-based programmes.</td>
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<tr>
<td>New Zealand teachers working in science education in the upper primary and intermediate schools lack confidence in their knowledge in science education.</td>
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<td>A relationship between higher teacher qualifications and student achievement in science was evident in the TIMSS study.</td>
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<td>The relationship between teacher qualifications and student achievement does not of itself address gender issues.</td>
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<tr>
<td>Where research has been carried out in science education, that research has not necessarily been translated into educational practice.</td>
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<tr>
<td>Hands-on teacher professional development programmes that include specific attention to gender equity issues have been found to influence changes in teacher practice.</td>
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<tr>
<td>The varied nature and length of in-service teacher education programmes in science suggest there is a need for more evaluation of the effectiveness of these programmes.</td>
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<tr>
<td>Research-based development in Māori science education is a priority.</td>
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<tr>
<td>Research-based development in Māori science education should include : consideration of Māori students’ learning in science, teaching and learning styles, cultural dimensions of learning and curriculum, motivational, social and cultural factors that inhibit learning, language acquisition in science education and policy research related to Māori science education.</td>
</tr>
<tr>
<td>Much of the action research reported in science education for the decade is no longer part of teacher preparation or in-service programmes.</td>
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<tr>
<td>If New Zealand is to move to a knowledge based society, education must ensure that gender and diversity are not barriers to participation and achievement in science at senior schooling and tertiary levels.</td>
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Chapter Five: Mathematics

“Mathematics in the New Zealand Curriculum”, published in 1992, replaced the syllabuses “Mathematics: Junior Classes to Standard 4” and “Mathematics: Form 1 to 4”.

The goals of mathematics education as stated in the curriculum are: to help students develop a belief, interest and confidence in mathematics, deal with the mathematics of everyday life in our technologically oriented, information rich society, and prepare students for work. Students are expected to achieve in the domains of mathematical processes, number, measurement, geometry, algebra and statistics, and to acquire a range of skills. A problem-solving approach is recommended for teaching the curriculum. In a statement addressing individual needs of the students, the curriculum states:

‘it is axiomatic in this curriculum statement that mathematics is for all students, regardless of ability, background, gender, or ethnicity.’ (1992, p.12)

With this statement, the Mathematics Curriculum acknowledges one of the principles of the New Zealand Curriculum Framework — gender inclusivity.

5.1 APPROACH TO THE REVIEW OF GENDER DIFFERENCES IN PARTICIPATION AND ACHIEVEMENT IN MATHEMATICS

This chapter begins by examining social and feminist influences on mathematics teaching and pedagogy in New Zealand. With arguments relating to the curricular context in mind, we review the mathematics achievement of New Zealand students in international contexts, and examine local patterns of achievement and participation.

The body of the literature review begins with an examination and critique of psychological explanations of gender difference, and moves on to discuss what girls themselves have to say about their experiences of mathematics. Gender issues relating to assessment follow, with the final section of the chapter discussing mathematics achievement in single-sex and co-educational environments. The relative scarcity of research examining mathematics with respect to gender in New Zealand (with some notable exceptions), has meant the review is weighted more towards the international literature.

5.2 MATHEMATICS AND THE MATHEMATICS CURRICULUM IN SOCIETY

In an overview of how social, feminist and societal expectations of gender equity have influenced education generally, and mathematics more specifically, Haynes (1994) traced the development of the current New Zealand curriculum for mathematics. She noted that until the 1970s, the expected differences in girls’ and boys’ post-school options were supported by a pluralist perspective in mathematics education that saw girls directed into a lower level of mathematics than boys. With the recognition that girls should be entitled to the same post school options as boys, mathematics education in the form of the 1972 curriculum moved towards a more individualistic approach to teaching mathematics.

Haynes characterised the assumptions supporting this document as assimilationist with respect to gender, as girls and boys were expected to have similar outcomes, given similar curriculum content. Difference in needs in this document and that of the 1987 curriculum, were defined in terms of different ability. Haynes argued that girls in the 1970s and 1980s still laboured under the assumption that females did not shine in mathematics, and that maths was primarily a male domain.
Haynes (1994) also noted the influence of EQUALS in New Zealand classroom practice in the 1980s. EQUALS, an American movement of educators, was interested in developing classroom programmes and training that would help teachers facilitate the learning of all students, particularly women in mathematics. EQUALS promoted a problem solving approach, based around a pedagogy that involved students learning co-operatively, using concrete problems from contexts with which they were familiar. Haynes argued that the influence of EQUALS, along with international classroom based research, encouraged New Zealand mathematics educators to produce a ‘social justice’ model of mathematics education in the curriculum in the 1990s; that is, a model which recognises and works with the variety of experiences of students, including girls, in mathematics contexts.

Alongside and instrumental to changes to mathematics pedagogical practice, were challenges to the way mathematics as a subject was conceptualised. Recognition of the multiple experiences students brought to mathematics involved, to some extent, redefining what counted as ‘mathematics’. Haynes (1994) noted these arguments opened up spaces in which feminine and cultural perspectives could become part of the structure of mathematics. Similar arguments have been made by other New Zealand writers.

The challenge to mathematics and the mathematics curriculum was taken up by Walls (1997), in her comments on the current curriculum. In her stock–take of gender issues in mathematics at primary school, Walls stated that it was clear from the evidence that females were not inferior to males in mathematics. The evidence further demonstrated that, in the senior school, the cause of ongoing gender differences in participation and achievement should not be attributed to females. Rather: “the nature of mathematics itself must be changed to acknowledge, value and reflect the life worlds of all students” (p.4), instead of reflecting mainly male priorities and experiences.

Wall described the publication of “Mathematics in the New Zealand Curriculum” as a positive step, as it is based on the assumption that mathematics teaching has failed girls in the past. However, she noted the curriculum failed to acknowledge other important issues thought to impact on gendered participation and achievement. These are: teacher bias and management practices, quality of resources in terms of freedom from gender bias, the nature and effects of school assessment, school organisation and a host of other variables. Thus from her point of view, further work is needed to create a gender-inclusive mathematics environment.

Calls to recognise the constructed nature of mathematics have also been made in the context of the mathematics achievement of Māori girls and women. McMurchy-Pilkington (undated) demonstrated the complexity of mathematical knowledge used by Māori women in the preparation of kai in the marae kitchen. She noted how this mathematics, characterised as oral, socially shared, localised, and embedded in a specific cultural context, falls outside the definition of mathematics taught in schools. It is thus silenced and devalued in the school context. Instead, Māori girls are seen as failing, because they are judged by criteria that do not value or even recognise the cultural capital that they take with them to schools. She suggests an alternative way of explaining the apparent mathematics failure:

‘Rather than viewing Māori girls’ under-achievement in mathematics as a lack of ability or a deficiency, it should instead be redefined as a failure by the system to recognise the mathematical knowledge that Māori girls build up outside of school and on the marae.’ (p.30)

McMurchy-Pilkington emphasised the sentiments of the New Zealand Mathematics Curriculum, which states that Māori girls (amongst other groups) must have their experiences included in the formal educational practices. For teachers, this means identifying and linking the knowledge that Māori girls bring to school to classroom mathematics: this is a process which will help to value this
knowledge and also help knowledge to generalise across contexts. For both McMurchy- Pilkington and Wall (1997), mathematics must be made inclusive of students.

Contrasting concerns about the construction of mathematics have also been voiced by Clark, Forbes and Blithe (1994). In writing of the curriculum-assessment interface, Clark et al. (1994) fear that the emphasis given to problem-solving and processes in the curriculum statement, may actually disadvantage girls. Their concern is based on international evidence (discussed below) that suggests girls do not do as well on mathematical tasks that require problem solving or applied mathematics. While this concern also speaks to the value placed on certain processes or domains of mathematics, the literature discussed in the Pedagogy and Enacted Curriculum section of this chapter, demonstrates how these gendered patterns may be a function of pedagogical practice, and as such can be addressed through appropriate teaching methods.

We turn now to the measured outcomes of the enacted curriculum.

5.3 NEW ZEALAND STUDENT ACHIEVEMENT IN MATHEMATICS: INTERNATIONAL COMPARISONS

The Third International Mathematics and Science Study (TIMSS) provides a primary source of international comparative data for the mathematics performance of New Zealand students. New Zealand data were collected for a nationally representative sample of 9 year olds and 14 year olds in October 1994, and for students in their final year of schooling in August 1995. Paper and pencil tests and a number of hands on tasks (Performance Assessment) were used to gauge students achievement, while background and attitudinal data was gathered via a Student Background Questionnaire.

Table 5.1 shows New Zealand students mean performance compared with the international mean for the three population groups.

| TABLE 5.1 NEW ZEALAND'S MEAN PERFORMANCE IN TIMSS MATHEMATICS COMPARED WITH THE INTERNATIONAL MEAN FOR THE THREE POPULATION GROUPS |
|--------------------------------------------------|---------------|
| New Zealand Mean Achievement | International Mean |
| Standard 2 (Year 4) | 440 (s.e.4.0)* | 470 |
| Standard 3 (Year 5) | 499 (s.e.4.3) | 529 |
| Form 2 (Year 8) | 472 (s.e.3.8) | 484 |
| Form 3 (Year 9) | 508 (s.e.4.5) | 513 |
| Years 12 & 13 in final year of schooling | 522 (s.e.4.5) | 500 |

*s.e. indicates standard error
Source: Mullis et al., 1997, Beaton et al, 1996b

Mean scores for 24 countries at the New Zealand equivalent of standard 2 ranged from 378 to 561, and for 26 countries equivalent to standard 3, from 400 to 625. The means for New Zealand students (see Table 5.1) at standard 2 and standard 3 levels were statistically significantly below the international means (Mullis et al., 1997).

Six countries at the level equivalent to standard 2 had significant gender differences in favour of boys. No significant gender difference was found for New Zealand students; however, the direction of the difference favoured female students. Three countries found statistically significant gender differences at standard 3 level that favoured boys. Again, while significant gender differences were not found for New Zealand students, the direction of the difference favoured girls (Mullis et al., 1997).

New Zealand students also performed just below but not significantly differently from the international mean at form 2 and form 3 levels. The range of scores for the 39 countries that satisfied
sampling guidelines at form 2 level was 348 to 601, with an international average of 484. At the class level equivalent to form 3, country scores ranged from 354 to 643 with an international average of 513.

Six countries at the form 2 level found statistically significant gender differences favouring boys. New Zealand was not among these countries. Eight countries at the form 3 level found significant gender differences in favour of boys. While gender differences favouring boys were found in New Zealand at this level, they were not statistically significant (Beaton et al., 1996b).

Summarising the international trend for gender differences at ages 9 and 13, Beaton et al. (1996b) and Mullis et al. (1997) note that gender differences in mathematics achievement were small or essentially non-existent for most countries. However, the direction of the gender differences that did exist favoured boys rather than girls. Note that at standard 2 and standard 3 levels, New Zealand’s results contradicted this international trend; however, both boys and girls fell below the international average.

The mathematics and science literacy component of TIMSS examined the residue of mathematics and science learning retained by final-year students, regardless of their current areas of study. These students were on the point of leaving school to enter the workforce, or post-secondary education. The mathematics component of this study included items on: number sense, algebraic sense, measurement and estimation, a reasoning and social utility sub-scale which assessed students’ ability to interpret graphs and tables, and think critically about mathematical information presented to them in real world contexts.

At 522 (s.e. 4.5), New Zealand’s performance in mathematical literacy was significantly above the international mean (500). The mean scores for participating countries ranged from 356 to 560. At school leaving age, New Zealand male students significantly outperformed New Zealand female students, a trend observed in 18 of the 21 systems involved in the study (Mullis et al., 1998). Chamberlain (1998) noted that while significant differences in the New Zealand cohort were found, the difference between the genders was numerically one of the smallest.

**SUMMARY OF NEW ZEALAND ACHIEVEMENT IN INTERNATIONAL COMPARATIVE STUDIES**

New Zealand students perform well below the international mathematics mean at middle primary school and around about the international average in the first year of secondary school. However, they perform above the international average at the end of schooling. Significant gender differences in mathematics performance were found in New Zealand at school leaving age only.

**5.4 MEAN DIFFERENCES IN MATHEMATICS ACHIEVEMENT IN NEW ZEALAND BY GENDER, SOCIAL CLASS AND ETHNICITY**

This section reviews achievement in mathematics in New Zealand, drawing out, from available information, the diversity in mathematics outcomes for boys and girls of different ethnicities and social classes. Organised sequentially, this section draws most of its information for the primary level from the National Education Monitoring Project, and the Third International Mathematics and Science Study (TIMSS), and for the secondary level from TIMSS, and analyses of secondary school examinations.

While mean gender differences in mathematics achievement are in evidence in the literature, these differences are often small compared to achievement patterns based on ethnicity and social class (Flockton & Crooks, 1997; Nash & Harker, 1997; Praat, 1999; Sturrock, 1993).
5.4.1 Primary School and Intermediate Achievement

Nationally standardised assessment procedures for use with children entering schools were introduced by the Ministry of Education in 1997. Published in English as School Entry Assessment (SEA), and in Māori as Aro matawai Uranga-a-Kura (AKA), these procedures include assessment on numeracy (Checkout/Rapua), oral language (Tell Me/Ki Mai), and literacy (Concepts About Print/Nga Tikanga o te Tuhi Korero).

While the SEA/AKA information provided is not strictly representative of the population, the distribution of the sample collected is very close to that of the 5 year old population, which allows some conclusions to be drawn, bearing the above considerations in mind. There were approximately even numbers of boys and girls in the sample (52% boys and 48% girls).

Gilmore (1998) reports that, on the whole, the data suggests that the SEA group of new entrants were better able to perform the items of the oral language test than the numeracy test or literacy test. Significant gender differences were also found, with girls performing better than boys on the Checkout scale (girls 18.4, boys 17.1).

Young-Loveridge (1992a) reports on a longitudinal study that followed the mathematical progress of 81 students in their first 4 years of primary school in Christchurch schools (in the final year, 68 students were available). Using the specifically designed Number Tasks Interview to assess children’s number concepts and skills over each of the four years, Young-Loveridge found that there were no overall gender differences between boys and girls in her sample, but there were significant differences within each gender group.

For analysis, boys and girls were split at age 5 into 3 groups — low ability, medium ability and high ability. While there was some movement between ability groupings between 1985 and 1989, especially in the middle ability grouping, most students stayed in their original ability group.

Of most concern was the finding that girls in the low ability group progressed significantly more slowly than boys in the same ability group, and boys and girls in the middle and high ability groups over time. Of the 9 boys who started in the low ability grouping, 4 had moved to the middle group by age 9, whereas of the 12 girls who started in the low grouping only one had moved to the middle band. In terms of raw scores, boys in both the low and middle ability groups increased their advantage over girls in these groupings over time — this trend was statistically significant for the low group only.

Young-Loveridge discusses several possible reasons why girls in the low ability group did not progress as rapidly as boys of the same initial ability. Compared with boys in the low ability group, girls were less confident about their mathematics ability. Research shows girls receive less teacher attention than boys, and teachers may be more likely to give attention to confident maths students. Given this, Loveridge suggests girls of low ability and confidence may attract less teacher attention than other students. While other possible explanations are discussed, information about these factors was not collected in this study. Although the number of students involved in this study was small, the longitudinal methodology brings new information to an area characterised by cross-sectional research.

Mathematics assessment results for the National Education Monitoring Project [NEMP] reveal statistically significant gender differences on 3 out of the 50 mathematics tasks at year 4 — two favouring girls and the other favouring boys (Flockton & Crooks, 1997). By contrast 45 statistically significant differences were found among students from schools grouped by decile into low (decile 1–3), medium (4–7) and high (8–10); students from low decile schools performed the worst in each case. When Māori and non-Māori results for year 4 were compared, statistically significant differences favouring non-Māori were found on 40 of the 50 tasks. Comparative data for Pacific students was not available for NEMP mathematics.
Similar patterns are evident from the NEMPs year 8 data. Statistically significant gender differences were found on eight of the 53 mathematics tasks, seven of which favoured girls; many more differences were found in comparisons between schools of different decile and between Māori and non-Māori students.

Results of the TIMSS for primary school students support the NEMP findings (Chamberlain, 1997). No significant gender differences were found for 9 year old and form 2 students in the TIMSS taken as a whole. More striking differences were found when considering differences between ethnic groups (Table 5.2). Māori and Pacific students of both genders did not perform strongly compared with Pakeha and Asian students.

### Table 5.2 Standard 2, Standard 3 and Form 2 Mean Percent Correct: Achievement on the TIMSS Mathematics Items by Gender and Ethnicity

<table>
<thead>
<tr>
<th></th>
<th>Pakeha European mean percent</th>
<th>NZ Māori mean percent</th>
<th>Pacific mean percent</th>
<th>Asian mean percent</th>
<th>All students mean percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STANDARD 2 (YEAR 4)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>45</td>
<td>37</td>
<td>30</td>
<td>40</td>
<td>41.5</td>
</tr>
<tr>
<td>Boys</td>
<td>44</td>
<td>32</td>
<td>29</td>
<td>51</td>
<td>39.8</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>34</td>
<td>30</td>
<td>46</td>
<td>40.7</td>
</tr>
<tr>
<td><strong>STANDARD 3 (YEAR 5)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>58</td>
<td>49</td>
<td>42</td>
<td>59</td>
<td>54.4</td>
</tr>
<tr>
<td>Boys</td>
<td>58</td>
<td>39</td>
<td>40</td>
<td>59</td>
<td>51.9</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>45</td>
<td>41</td>
<td>58</td>
<td>53.2</td>
</tr>
<tr>
<td><strong>FORM 2 (YEAR 8)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>50</td>
<td>38</td>
<td>35</td>
<td>52</td>
<td>46.4</td>
</tr>
<tr>
<td>Boys</td>
<td>50</td>
<td>36</td>
<td>32</td>
<td>57</td>
<td>46.2</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>37</td>
<td>34</td>
<td>55</td>
<td>51</td>
</tr>
</tbody>
</table>

Sources: Garden, 1997, and Garden, 1996

### Summary of Primary and Intermediate Achievement Data and Implications

Overall, results of primary school data show no significant gender differences, or, slight gender differences favouring girls. However, there is variation within gender groups when ethnicity, social class and ability are taken into consideration.

While not directly linked to gender, Darling-Hammond (1998) reviewed several large North American studies that suggest the level of teacher education and experience accounts for between 30-90 percent of variance in students mathematics scores. Higher levels of mathematics qualification (e.g., masters degrees) were associated with higher achievement in all cases. This is a finding that may stand further examination in the New Zealand primary school context, given our poorer comparative performance at this level.

#### 5.4.2 Participation in Mathematics in the Senior Secondary School

The popularity of mathematics in the senior secondary school among students of both genders declined through the 1990s. Increasing gender differentiation in mathematics selection is evident as students move through the senior secondary school.
Mathematics

Between the years 1970 and 1988, the proportion of non-Māori female students taking School Certificate Mathematics almost doubled (1970, 40%; 1988, 78%), making maths almost as popular among non-Māori female students as it was among non-Māori male students (Forbes et al. 1990). For Māori females, the proportion tripled in the same time, bringing their participation rates much closer to that of Māori males (1970, 20%; 1986, 61%).

In the decade to 1997, mathematics has remained second to English as the most popular choice of male and female School Certificate Candidates. Male students were slightly more likely to select maths than females over this time, with the difference in participation rates closing to 1997. While mathematics retained its overall second ranking, the proportion of male and female students taking mathematics for School Certificate declined. In 1987, 83.2 percent of male students and 78.4 percent of female students selected maths, while in 1997 69.5 percent of males and 68.6 percent of females chose mathematics for School Certificate (Praat, 1999).

A similar pattern of decline in mathematics popularity over time can be seen in mathematics selection for Sixth Form Certificate students, although the relative 2nd place ranking of mathematics was maintained. Mathematics has been consistently more popular with male than female students. 72.4 percent of year 4 Sixth Form Certificate males chose mathematics in 1988 and 58.3 percent of female students. Participation dropped to 57.5 percent of males and 49.2 percent of female students by 1997 (Praat, 1999).

Mathematics with Statistics

Between 1990 and 1997, Mathematics with Statistics was the most popular subject among male Bursary candidates and the second most popular subject among female Bursary candidates. While the overall proportion of male and female students selecting this subject for Bursary declined over this time, males continued to select Mathematics with Statistics in greater proportions than females. In 1997, 51.6 percent of males selected Mathematics with Statistics for Bursary and 41.4 percent of females. Analyses presented by Forbes et al. (1998) show Māori participation to be very low in this subject, with Māori contributing about 6 percent of candidates.

Mathematics with Calculus

In 1990, 51.1% of male students taking a bursary subject selected Mathematics with Calculus, compared with 32.2 percent of females taking Bursary subjects. This gender difference in participation continued to 1997, when 40 percent of males selected Mathematics with Calculus and 26 percent of females (Praat, 1999). In the years 1992–1995, Māori contributed around 5 percent of Bursary Mathematics with Calculus candidates (Forbes et al. 1998).

Combination Mathematics with Calculus and Mathematics with Statistics

The proportion of students taking the calculus and statistics combination is of interest because of the well established finding that taking more mathematics subjects generally increases performance in mathematics (Blithe, Forbes, Clark, Robinson & Whitehall, 1994; Willingham & Cole, 1997; Forbes et al. 1990; Forbes, Clark, Blithe & Chamberlain, 1998). In 1988, the percentage of males and females studying both mathematics was 56 percent and 38 percent respectively (Forbes et al. 1990; Blithe et al. 1994). From 1990 to 1995, more males than females selected both maths, with the percentage of males declining from 41 percent to 31 percent and the proportion of females remaining stable at around 20 percent over this time (Forbes et al. 1998).
5.4.3 Secondary School Achievement

Gender differences overall in mathematics performance in the TIMSS at the beginning of secondary school (form 3) were negligible across all ethnic groups (Chamberlain, M., 1996c). However, differences in performance with respect to the content areas and performance expectations assessed were beginning to emerge.

TIMSS also measured performance on a number of mathematics content areas (eg, algebra, measurement), as well as providing information on the types of performances students were expected to demonstrate when answering the test items (eg, knowing, complex procedures, problem solving). While there was no overall significant gender difference in form 2 and form 3 students, there were some marked gender differences in performance on some content areas at form 3. Form 3 boys performed to a higher level than girls, on average, in the areas of common and decimal fractions, measurement and proportionality (Chamberlain, M., 1996c).

In terms of the ‘apparent growth’ in achievement in content areas between form 2 and form 3, boys' achievement had grown by at least 10 percent in the areas of common fractions (meaning and representation), geometry (other than congruence and similarity) and probability. The only area that registered high growth for girls was algebra (excluding linear equations). In terms of performance expectations, the types of items on which form 2 girls were more successful than boys were those that required routine/complex procedures or knowing skills, while boys were more successful on items requiring complex procedures. Differences on the expectation of problem solving at this level were content dependent. In form 3, items that exhibited large gender differences in favour of boys required application of complex procedures and problem solving strategies. (Chamberlain, M., 1996d).

Praat’s (1999) collation of secondary school examination data also showed more discrepancy in achievement among the groups ‘all students, and Māori and Pacific students, than between genders in any of these groups for School Certificate (1992–1997), Sixth Form Certificate (1988–1997) and Bursary mathematics (1990–1997)’. For example, 1998 School Certificate Mathematics data showed slightly higher proportions of boys than girls receiving a C grade or above for the groups ‘all students’ (1.8% above girls), and Pacific students (2.7% above girls), and no difference for Māori; however 58.3 percent of boys from ‘all students’ received a C grade, compared with 33.6 percent of Māori boys and 31.2 percent of Pacific boys.

Forbes, Clark, Blithe and Chamberlain’s (1998) analysis of School Certificate mathematics achievement from 1992 to 1995 showed differences in the mean score between non-Māori males and females to have been consistently small, but significant at the 5 percent level. While Māori males on average scored higher than Māori females in this period, except for 1995, these differences were statistically significant only in 1994. Of greater concern to Forbes et al. is the large differential between Māori and non-Māori students, with the mean score for non-Māori students being just over 10 percent that of Māori.

Nash and Harker’s (1997) analysis of mean School Certificate mathematics achievement of pupils from 37 schools show gender differences favouring males across all social classes. Gender differences within classes ranged between 2.0 percent (semi-skilled) and 8.1 percent (lower professionals). Using the Elley-Irving socio-economic scale, they found the largest group mean achievement differences occurred between students from different classes. By way of comparison, the largest mean gender difference in achievement was recorded at 8.1 percent for students categorised in the lower professional class, while the largest inter-class difference was recorded between the high professional and unemployed at 26 percent.

While large differences among groups by ethnicity were also a feature of Sixth Form Certificate mathematics results, the gender difference generally favoured females at this level. Around half of all
females taking Sixth Form Certificate Mathematics achieved a grade 4 or above from 1988 to 1997, which was consistently about 5 percent above the proportion of male students achieving to the same level. Gender differences for Sixth Form Certificate mathematics were not as consistent among Māori and Pacific students with around 25–35 percent of students attaining a grade 4 or above. However where gender differences were in evidence, they generally favoured females (Praat, 1999).

Forbes et al. (1998) note that in the late 1980s, the pattern of achievement in Sixth Form Certificate mathematics showed more males than females at the extreme ends of the distribution, with more females in the middle. However, in their analysis of 1992–1995 data, females appeared to be making inroads on the highest grades with more females than males attaining grades 2 and 3. As with their School Certificate data, the more striking differences were between Māori and non-Māori. Māori females gained more grade 3s than Māori males, and this accounts for the higher proportion of Māori females in the top 3 grades.

Gender differences favouring male students were reported in Praat’s (1999) collation of Bursary Mathematics with Statistics results from 1990–1997. Larger proportions of male than female students attained a grade of B and above for Bursary Mathematics with Statistics, across the groups ‘all students’ and Pacific students. For Māori students, a decrease in the proportion of male students attaining a B grade or better, and an increase in the numbers of females attaining a B grade or better from 1992 to 1997, saw the gender gap closed in 1997. Forbes et al. (1998) reported the higher achievement of non-Māori males compared with non-Māori females was significant in the period 1992 to 1995.

Gender differences in the performance of ‘all students’ in Bursary Mathematics with Calculus were reportedly minimal from 1990 to 1997, with around half of all students attaining a B grade or above. These findings are supported by the analyses of Forbes et al. (1998), who found that while achievement differences generally favoured males, these were small and only reached statistical significance in 1993 and 1995 (data from 1992-1995 considered). While generally lower proportions of females appeared to achieve to B grade or above among Māori and Pacific students, the small number of students participating in this subject mean these results should be treated with caution (Praat, 1999).

The TIMSS mathematics and science literacy study of a 1995 cohort of students in their final year of schooling showed that on mathematical literacy, New Zealand males significantly outperformed New Zealand females by 29 points on the Rasch scale, a difference of approximately six percent in the mean percent correct approach. This gender difference was apparent across all participating systems, reaching statistical significance in 18 of the 21 participating systems (Chamberlain, M., 1998b).

As Table 5.3 shows, this gender difference is evident among Pakeha, Māori and Asian ethnicities, but is not as marked between Pacific males and females.

<table>
<thead>
<tr>
<th>TABLE 5.3</th>
<th>MEAN MATHEMATICS LITERACY SCORES FOR STUDENTS IN THEIR FINAL YEAR OF SCHOOLING, BY ETHNICITY AND GENDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>Pakeha European mean percent</td>
</tr>
<tr>
<td>Pakeha</td>
<td>518</td>
</tr>
<tr>
<td>European</td>
<td>482</td>
</tr>
<tr>
<td>mean percent</td>
<td>429</td>
</tr>
<tr>
<td>Māori</td>
<td>516</td>
</tr>
<tr>
<td>Pacific</td>
<td>522</td>
</tr>
<tr>
<td>mean percent</td>
<td></td>
</tr>
</tbody>
</table>

Source: Garden, 1998

Bursary data was available for the group ‘all students’ from 1990-1997 and for Māori and Pacific students from 1992-1997.
Gender differences favouring New Zealand males were evident, regardless of whether students were taking mathematics courses or not, at the time of participating in the mathematics and science literacy study. Gender differences favouring males were also apparent within the group of students taking both Bursary mathematics courses. The three domains of mathematics literacy were: number sense (16 items) — the interpretation of meanings of common and decimal fractions, percentages and proportionality; algebraic sense (7 items) — use of simple equations, formulas and graphs; and measurement and estimation (14 items). While girls did not do significantly better than boys on any of these items, items where there was no significant gender difference but a tendency for girls to perform better, were from the algebra domain.

The relative emerging strengths of boys in some areas of mathematics at form 3 are used by Chamberlain to help explain the overall significant gender difference of males and females at school leaving age. Chamberlain, M., (1998b) states that items used in the mathematics literacy assessments were drawn from the areas in which boys were performing well at the beginning of secondary school, thus it is possible that females’ poorer performance reflects this item selection.

<table>
<thead>
<tr>
<th>SUMMARY OF NEW ZEALAND ACHIEVEMENT RESEARCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taken as a whole, the New Zealand research indicates wide diversity in the patterns of mathematics achievement of boys and girls by ethnic identity and social class.</td>
</tr>
<tr>
<td>While results of international comparative studies indicated all New Zealand students performed below the international mean at primary and intermediate levels, patterns of difference by social class and ethnicity indicate that the education of boys and girls from families with low SES, Māori boys and girls and Pacific boys and girls should be educational priorities. In addition, Young-Loveridge’s (1992a) research indicates that the education of students in lower ability groups, particularly girls, require attention.</td>
</tr>
<tr>
<td>Available data show negligible gender differences in mean achievement across all ethnic groups at the beginning of secondary school. More striking are the differences between ethnic groups. Differences between ethnic groups remain a feature of achievement data through secondary school, with gendered achievement patterns evident in the senior secondary school examinations. As students move through secondary school, boys are increasingly more likely to choose mathematics. Thus, comparisons of achievement between genders become increasingly more tenuous. Notwithstanding the higher achievement of females across the board at Sixth Form Certificate, and differences in participation rates, males achieve to a slightly higher level in School Certificate, to a higher level in Bursary Mathematics with Statistics and statistically significant better in mathematics literacy (TIMSS) at the end of secondary school. The exception to this pattern is achievement in calculus, where there is very little gender difference (although it is statistically significant).</td>
</tr>
<tr>
<td>Patterns of achievement on various content and performance expectations, (also called cognitive complexity in the literature), appear to be different for boys and girls from the beginning of secondary school (TIMSS). At form 3, boys show strengths in the content areas of number sense and measurement, while girls show improvement from form 2 achievement in the area of algebra. Boys also show comparative strength in more cognitively complex items such as complex procedures, and were more likely to answer problem solving questions correctly.</td>
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In the following section, the gender gap is examined in the context of international achievement reviews.

5.5 THE CLOSING GENDER GAP

Writing at the beginning of our focus decade (1989), Lynn Friedman reviewed evidence of gender differences in mathematics achievement. She conducted a meta-analyses of 98 studies of gender difference in quantitative tasks, spanning the years 1974 to 1987. Her review of evidence to 1989 mirrors
the trends found in the New Zealand data — while there are no gender differences, or slight differences favouring females at primary school, increasing gender differentiation favouring males seems to be the trend (increasing with age) at secondary school.

Friedman applied meta-analytic techniques to studies of mathematical gender difference. This included standardising, over a number of studies, the measurement of gender difference, so as to compare them. She estimated parameters for two statistical models: a random effects model that generated a median effect gender difference size, and a regression model, used to help account for the variation in gender differences over 98 studies. These techniques are useful in comparing gender differences in groups of studies from different time spans, and accounting for the variance in gender differences between individual studies.

Similarly to earlier meta-analyses incorporating variables for the age of the study (Rosenthal & Rubin, 1982; Becker & Hedges, 1984 cited in Friedman, 1989), Friedman’s regression model included a significant co-efficient for age of the study to explain the varying size of gender difference in mathematical ability between studies. In short, the later the study, the smaller the gender difference was likely to be.

Further evidence of the decrease in gender differences was produced by comparing the median gender difference found in Friedman’s group of studies (1974–1987), compared with the meta-analyses of gender difference found for Maccoby and Jacklin’s studies, collected in the 1960s and 1970s. Friedman’s meta-analyses showed a much smaller difference than that found for meta-analytic reviews of Maccoby and Jacklin's evidence. That is overall gender difference was smaller for the group of later studies (1974–87) compared to the earlier studies (1960–74).

In addition, the confidence interval for the median gender difference in Friedman’s analysis covers zero (no difference). Therefore, Friedman could not say, with 95 percent certainty, that any sex differences exist in the general United States school age population. Thus she concludes, from her statistical analysis, that the average sex difference favouring males was very small, and that this difference in favour of males “is decreasing over short periods of time. This is evidence for environmental explanations of sex differences, for surely it is not biology but environmental influence that has been changing at the same time that sex differences have been decreasing” (1989, p.206).

Friedman’s (1989) analysis revealed the gender difference in mathematics as a whole was small and decreasing, but did not provide information about various mathematical sub-areas. This gap in the literature was addressed in a meta-analysis conducted by Hyde, Fennema and Lamons in 1990 (also reported in Frost et al. 1994).

Hyde et al. (1990) found the overall gender difference in mathematics achievement was small, and favoured males. However, among the studies included, tests of homogeneity found the studies to be statistically non-homogeneous. Studies were partitioned into more homogeneous groupings according to a number of variables including; cognitive level of the test, mathematics content, age, ethnicity, selectivity of the sample, and year of publication. The significance of the contribution of these variables to the variance of the gender differences was reported.

The cognitive level of the test was found to contribute significantly to the variation in gender differences, with females having slightly superior computation skills, and males having slightly superior problem solving skills. In the tests, there was no difference in the understanding of mathematical concepts. Analyses of differences in the content of mathematics tests was compromised by the number of studies that did not report the specific content of the test. However, there was a small but significant effect for content, indicating that there were no gender differences in arithmetic or algebra, but a slight male advantage in geometry.
Age of participants was broken down into 5–10 years, 11–14, 15–18, 19–25 and 26 years and older. Analyses showed females had a slight edge in the first two age groups, while males’ performance increased over the remaining 3 age groups. The effect of age on the magnitude of the gender difference was found to be large and significant. Analyses of age by cognitive level showed: a small female edge in computation in the two youngest age groups, which disappeared in later years; no difference in any age with respect to understanding of mathematical concepts; a very slight female difference in problem solving at age 11–14; and a moderate male advantage in the 15–18 and 19–25 age brackets.

Ethnicity of the students was not found to be a significant contributor to variance in gender difference; however, the selectiveness of the sample was. In general, samples females had a slight edge, while in samples specifically selected for their performance, males had an increasing advantage as the performance of the samples increased. So for example, gender differences in gifted children would be among the largest. While the year of publication was not found to contribute significantly to gender difference variance in the regression analyses, differences in gender discrepancy were found, showing the male advantage in mathematics performance appears to be decreasing over time.

While these meta-analyses supply limited evidence of any gender difference overall, their findings in relation to specific content areas are to some extent consistent with the results of New Zealand content patterns in the TIMSS study. Girls may have a relative strength in the area of algebra, while boys have a relative strength in measurement and number. This is a finding that is repeated often in studies of gender difference reviewed for this report. In explaining gender differences in mathematics, it seems we may be referring not to mathematics as a whole, but to specific areas and skills. The extent of gender difference may also vary with the ability level of the students. Further research in the New Zealand context is needed before any positive statements of this nature can be made.

Given the patterned nature of achievement within subject mathematics, it would seem unlikely that global explanations of mathematics success and failure could prove very useful. However, such explanations, derived from social and cognitive psychology, were common in the literature in the early to mid 1990s. This literature has been criticised for positioning girls as lacking in the requisite positive attitudes and confidence to succeed in mathematics, the loss of liking for, and confidence with, mathematics. It could also be read as a sign that all is not well in mathematics classrooms, or with subject mathematics as it is commonly constructed.

5.6 GENDER DIFFERENCES IN ATTITUDES AND AFFECT — MATHEMATICS IN THE COMPULSORY SCHOOL SECTOR

The strong influence of personality and social-cognitive psychology can be seen in the vast literature concerning the role of attitudes and explanatory styles as mediators of participation and performance in mathematics. Several hypotheses deriving from attribution and attitude theory have been presented to explain the under-achievement and under-representation of girls in mathematics.

Bllithe et al. (1993) note that boys and girls have been found to attribute achievement in mathematics differently. Attribution theory holds that how we explain our successes and failures may mediate our expectations of success in the future. Attributing success to ability (stable factor within our control) may lead students to expect success in the future, while if success is seen as contingent on factors outside of our control (eg, luck), we may be less motivated to try in the future. Conversely, if failure is attributed to inability, rather than luck or some environmental factor, our expectation of being able successfully to achieve in the future may be damaged (Heller & Zeigler, 1996). Drawing on international research (Howsen & Meilin-Olsen, 1986; Stipek, 1984; Barnes et al, 1987), Bllithe et al. claim girls are more likely than boys to attribute mathematical success to hard work or luck rather than ability, and their failures to lack of ability, while boys show the reverse trends. In approaching mathematics, girls may therefore have a decreased expectation of success.
A related concept is that of self-efficacy. The concept of self-efficacy, first coined by social learning theorist, Albert Bandura (1977), refers to a person’s belief (or confidence) in their ability or competence to complete a task. Efficacy beliefs are construed as mediators to participation (O’Brien, V., Kopala, M., and Martinez-Pons, M., 1999). For example, one would expect a person with a strong sense of mathematical self-efficacy to be more likely to participate in mathematics activities/career, and persevere for longer in difficult tasks, in the belief that they would successfully complete the task. A person with a strong sense of self-efficacy for a particular subject may also be more likely to perform well in the subject (Randhawa, Beanier, and Lundberg, 1993). With respect to mathematics and gender, the hypothesis is that a lower sense of mathematics self-efficacy among females leads to their under-representation in advanced mathematics courses, and careers requiring mathematics related skills.

Other attitudinal research focuses on girls liking for mathematics and the stereotyping of mathematics as a male domain. With respect to maths being stereotyped as a male domain, the hypothesis is that if maths is seen as a male domain, girls and women may be deterred from becoming involved (Shashaani, 1995).

Studies in the area of attitudes and gender difference typically measure a range of attitudinal and affective variables. Rather than split the review of any particular study, they are presented here in their entirety, with conclusions about the various attitudinal hypotheses drawn together at the end of this section. We start with a review of available New Zealand data related to attributions for mathematics success.

Young-Loveridge (1992b) reported on the mathematics attitudes of 9 year old students explored through interviews at the end of a longitudinal study which followed a group of Christchurch children from age 5. With respect to attributions, she found no differences in the proportion of boys and girls attributing success in maths to effort (around 60%) or luck (6%). However, boys were more likely than girls to think they were naturally good at maths (30% cf 12%). Failure in maths was attributed more to lack of effort among boys than girls (33% cf. 15%), and to task difficulty among girls (59% girls, 41% boys). Few students thought their failure in mathematics was due to luck, although around 10 percent of boys and girls thought they were not naturally good at maths. When comparing the attribution patterns of children of different ability, Young-Loveridge found the group of high ability boys made slightly different attributions for failure than the other groups; failure for this group was more likely to be seen as a lack of effort (unstable factor) whereas for high ability girls and low ability students, failure was more likely to be attributed to task difficulty. With respect to the low ability girls, Loveridge writes (1992a):

‘What is clear, however, is that as early as nine years of age (if not earlier), some low-achieving girls feel such as sense of hopelessness about mathematics and their ability to master it, that they will probably only rise above those feelings of despair when something specific is done to help them.’ (p.134)

These differences show the importance of considering boys and girls of high and low ability differently.

Further New Zealand data from TIMSS provides some indication of gendered attribution styles, although this data was not analysed with respect to achievement (Martin, 1996, 1997; Walker, 1998). Four attribution style statements were included in the TIMSS research. These statements referred to students’ perceptions of the reasons for success in mathematics, but did not ask them in relation to students’ personal success; rather, statements asked about students’ general beliefs about what it took to succeed in mathematics. In addition, no failure related items were asked. On a four point strongly agree to strongly disagree scale, students indicated their responses to the leader “To do well in
mathematics you need …” in relation to: (1) lots of natural ability; (2) good luck; (3) lots of hard work studying at home; (4) to memorise the textbook or notes.

At age 9, (standards 2 and 3) girls were slightly more likely than boys to believe you need lots of natural ability to do well in mathematics. The overall proportion of students endorsing this statement was high at around four-fifths. Girls were also more likely to endorse the belief that hard work was required to do well, although again this belief was held by a majority of students (4% gender difference in standard 2 and 5% in standard 3). Proportionally fewer students agreed that good luck was necessary to do well in mathematics (around 70% in standard 2 and just less 60% in standard 3). Māori and Pacific students endorsed this statement more strongly than Pakeha and Asian students.

Overall gender differences in relation to the four questions were small at the form 2 and 3 levels (Martin, 1996). The biggest difference was found in relation to the belief in natural ability. Boys were more likely than girls to agree or strongly agree with the statement that to succeed in maths you need lots of natural ability (5% difference at form 2 and 8% difference at form 3). Martin (1996) reported that students who achieved high mathematics scores were significantly less likely to believe that luck was responsible for their success.

Some differences in attribution patterns with respect to ethnicity were found. Pacific students were more likely than Pakeha, Māori and Asian students to believe that natural ability and good luck were necessary to succeed in mathematics. While there was universal support for the statement that hard work was required to do well, this statement was most strongly supported by Pacific and Asian students.

No specific gender breakdown for students at the end of their schooling was provided for these statements. However, there was an analysis of sub-populations who answered noticeably differently to the overall group means (Walker, 1998). While 66 percent of all students agreed lots of natural ability was required to do well in mathematics, Māori males and females and Pacific males were less likely to agree (51–57%) with this statement. Asian males were more likely to agree that good luck was required to do well in mathematics (41%), compared with a population proportion of 19 percent. There were no noticeable ethnic or gender deviations from the population percentage believing lots of hard work and studying at home was required for success in mathematics (94%). However, Pacific females were more likely to agree (86%) that memorising the textbook or notes (62%) was necessary to succeed in mathematics.

Attributions of success in TIMSS were not related to achievement in analysis. In addition, the attribution patterns could not be fully explained because questions about attributions of failure were not included in the assessment. The available data show small gender differences in the belief that ability is required to do well in mathematics, but these differences differ by age and ethnicity. Interestingly, the Asian males group, which performed best at school leaving age, were the most likely to attribute their success to luck (Walker, 1998).

Recent Australian research has investigated the influence of different attributional styles on gender differences with mixed results. At two co-educational schools in Victoria, Australia, Forgasz and Leder (1996) investigated the relationship between students’ beliefs about mathematics, and aspects of the classroom environment. Theirs was a multi-method study, involving: a large scale survey; student and teacher interviews; and observations of 25 Grade 7 mathematics lessons.

The attitudes of interest: were mathematics confidence, liking for mathematics, perceived usefulness of maths, maths as a male domain, attribution in maths success and failure, and parents and teachers beliefs about maths ability. Classroom variables assessed included teacher beliefs and actions, and the learning activities they encouraged. These beliefs were assessed within an Autonomous Learning Behaviours (ALB) model proposed by Fennema and Petersen (1985), which links societal/external
Influences (including the classroom) to students’ internal beliefs, and their learning behaviours and achievement in mathematics contexts.

782 grade 7 students from 35 schools filled out the survey, while 4 students (2 boys and 2 girls) from each of two schools were targeted in the classroom observation. Behavioural operational definitions of attitudes were developed for rating classroom behaviours. Students from the observed classes also filled out the survey questionnaire; additional self-report instruments providing open ended responses to their beliefs about mathematics and classroom environment, and achievement data.

Survey results indicated effect sizes for the affective variables were typically small, except for the maths as male domain variable, with females being less stereotyped than males. Other small but statistically significant findings included: females compared with males rated their own and their parents’ perceptions of their achievements lower; attributed mathematics success to ability to a lesser extent, but to effort to a greater extent; and attributed failure to task difficulty to a greater extent.

Survey results indicated significant correlations between mathematics attitudes and the classroom environment. Students were more likely to take responsibility for the successes in mathematics when they perceived their classroom environments to be encouraging of participation, and investigative skills, and more personalised (teachers interested in students as individuals). There was essentially little difference in these patterns among males and females, but personalisation, participation and investigation were found to be correlated to a number of affective variables, while only participation was linked to a number of affective variables for female students.

In summarising the classroom observations, the authors state that overt and more subtle forms of gender stereotyping constructing mathematics as a male domain were in evidence in the classroom. Observed also were behaviours that could help explain some gender difference in attitudes. Some of these classroom practices and examples are summarised below:

- teachers’ and classmates’ behaviours — linked to maths as a male domain and confidence (eg, teachers’ tolerance of boys’ bad behaviour; girls colouring in graphs constructed by boys; teachers underestimate girls’ confidence, compared with students and girls’ ratings; teachers overestimate boys’ achievements, compared with formal tests);

- learning activities in which students engage — linked to maths as a male domain and attribution of success (eg, boys’ greater interest in male learning contexts — horse racing and non-participation in ‘female’ contexts (eg, Scrabble) — where female students did most of the group work; boys still received high marks despite not participating);

- learning contexts — linked to maths as a male domain (real life examples drawn more from ‘male interest’ areas);

- learning settings and related assessments — linked to attribution (non-cooperation of boys in group work left girls to complete work while all received equal marks; formal tests seen as more important by both genders, disadvantaging girls who were more consistently on-task in class).

In a separate study, Forgasz and Leder (1996) explored first whether grade 9 boys and girls had different beliefs about themselves as learners of mathematics and English and then whether they held stereotyped views of mathematics and English. Students were asked to what extent they attributed their success and failure in mathematics and English to their ability, their effort, the task, or the environment. Two sorts of comparisons were made: the first looked at differences in attributions between mathematics and English; the second looked at gender differences in attribution within maths and within English.
Forgasz and Leder (1996) found males were equally likely to attribute their success in mathematics and English to their ability or their effort. Females were significantly more likely to attribute their English successes to their ability or to the task, compared with their mathematics successes, while mathematics failures were more likely to be attributed to their inability or the task than their English failures.

Females were more likely to rate themselves better at English than at mathematics, and also to believe that their teachers, parents and classmates would assess them as better at English than mathematics. There were no differences in males’ beliefs about their achievement levels in English and mathematics.

As no indication was given of the numbers of students responding to the open-ended questions about stereotyping, and liking for mathematics, it is difficult to judge the validity of the data. However, the authors note that both males and females stereotyped English as feminine, and males stereotyped maths as masculine. Taken together, these findings suggest that females particularly have different attributinal styles in mathematics and English. Females were more likely to see success in English (compared with maths) as attributable to their ability, while failure in mathematics was more likely to be attributed to inability compared with attributions for failure in English. This research suggests males are more likely than females to take responsibility for their success in mathematics, but not their failures, while females are more likely to take personal responsibility for their failures and less likely to take personal responsibility for their successes.

In a separate study, Leder and Forgasz (1997) report on students’ responses in their evaluation of a single-sex mathematics programme in a coeducational school conducted in 1996, and compare these findings to a previous evaluation run in the same school in 1993. Using the Mathematics Attitudes Scale and Mathematics Attribution scales in both periods, Leder and Forgasz found similarities in responses from two cohorts of students participating in grade 10 single-sex classes in 1993 (n = 151) and 1996 (n = 79). Males were more likely than females to see maths as a male stereotyped domain and rate their ability more highly than females. Females were more likely to attribute failure in maths tasks to the difficulty of the task. Differences in student responses in the two time frames showed that females in 1993 but not in 1996 were more likely than males to attribute their mathematics failures to lack of ability and lack of effort, while males in 1993 were more likely to attribute their mathematics successes to their ability.

While the 1993 responses tend to support hypotheses about the differential attribution styles of males and females in mathematics (See Forgasz & Leder, 1996 outlined above), the responses from students in the 1996 cohort did not. Males were not more likely than females to attribute their mathematics success to their ability, and females were not more likely to attribute their failures to their ability. That is, males compared with females did not take more personal responsibility for their success, and females compared with males did not take on responsibility for mathematics failures. Taken together, these studies suggest that gender differences in attributional style may be waning in the Australian context, or at least are only inconsistently found.

While differing explanatory style receives some modest support in the literature (Young-Loveridge, 1992b; Forgasz & Leder, 1996; Leder & Forgasz, 1997), a more promising and consistent mediator of success has been found in self-efficacy or confidence.

Available New Zealand data is descriptive rather than analytical, but does show some gendered trends changing through the school career. Both boys and girls have positive attitudes to mathematics in primary school (Martin, 1996, 1997; Flockton & Crooks, 1998). In the standard 2 and 3 cohort in TIMSS, girls were slightly more likely to report they liked maths, enjoyed learning maths, believed they did well at maths and that maths was an easy subject compared with boys in standards 2 and 3.
Responses to the attitude survey of NEMP at year 4 showed 2 significant differences between boys and girls. Girls were more likely to express enthusiasm for doing mathematics in their own time. However they were more likely to report they didn’t know how good their teachers thought they were at mathematics (Flockton & Crooks, 1998).

Positive attitudes to maths for both genders, but particularly among girls, continued into form 2 level. However, the pattern began to change with the first year of secondary schooling (Martin, 1996). In the first year of secondary school, and at school leaving age, the proportion of students reporting positive attitudes towards mathematics declined, with boys being more positive than girls. Boys at the beginning and end of secondary school were more likely to report that they liked maths, enjoyed learning maths and to believe they usually did well in maths (Martin, 1996; Walker, 1998).

Young-Loveridge (1992b) reported on the mathematics attitudes of 9 year old students explored through interviews at the end of a longitudinal study which followed a group of Christchurch children from age 5. A higher proportion of boys than girls rated mathematics as one of their top 3 favourite subjects (70% boys, 41% girls). The greater popularity of mathematics among boys was consistent over high and low ability groupings. Boys were more likely to answer affirmatively when asked if they enjoyed mathematics, with the low ability boys being more positive than even the high ability girls (girls 50%, boys, 60%). Boys across all ability groupings were also more likely to believe they were good at mathematics, with students basing their beliefs on the number of correct answers they made on worksheets or tests. Students who did not believe they were good at mathematics based this belief on the many incorrect answers they made in assessments. Other answers referred to intelligence, task difficulty, speed and effort.

Interesting research investigating the correlation between problem solving ability and affect was conducted with a group of Auckland students in 1996 and 1997. Kota (1997) used several tests of mathematics attitude and affect including: mathematical self-concept, interest, self-perceptions of ability, anxiety, usefulness, intrinsic motivation for mathematics, and enjoyment, to judge the relationship between these factors and problem solving ability among form 3 and form 4 students (216 girls, 129 boys). A significant gender difference favouring girls in problem solving was found among the form 3 cohort, but not the form 4 cohort.

Students were categorised according to ability grouping (low or high), and their achievement scores correlated with the affect scales. While overall these correlations were not very strong, they do show some interesting trends. For form 3 girls, positive affect toward mathematics was correlated with a better achievement among both ability groups. At form 4, higher affect scores among girls of low ability were positively related to achievement, but high affect scores for high ability girls were associated with lower mathematics scores (the latter associations were not strong). In short, for the high ability group of form 4 girls, positive mathematics affect was not associated with high mathematics scores.

For boys, affect seemed to match their ability more closely: low achieving boys (in form 4) had low scores on affect scales, while high achieving boys had high scores on the affect scales (especially for self-concept, interest, self-perception and enjoyment). These results suggest that affect plays a differential role in the achievement of boys and girls. In light of girls opting out of mathematics at senior school level, the author suggests it may be important to work with affective factors for high achieving girls to improve and sustain their problem solving ability into the future. While these data show interesting trends, and seem to suggest something happens to girls’ responses to mathematics between form 3 and form 4, they are associative only. Further research of this kind may prove fruitful.

At face value, the decline in females’ liking, perceived ability and enjoyment in learning mathematics at the end of secondary school, could be associated with the decline in mathematics achievement, and
could certainly be associated with differential patterns of participation in mathematics in the senior secondary school. However, the relationships between gender difference in attitudes and gender difference in mathematics performance and participation were not formally tested in TIMSS. It could also be noted that the decline in positive attitudes was also a feature of male students (though not as marked as for female students), who on average performed significantly better than female students.

Taken as a whole, the New Zealand data suggest a complex relationship between attitudes, such as confidence and achievement. Young-Loveridge's (1992b) data indicate the less positive attitudes of girls may begin earlier and may not necessarily be related to ability. Boys, across ability groupings, were more likely to believe they did well in mathematics than girls. TIMSS data also suggest a change in the positive attitudes of girls towards mathematics between standards 2 and 3 (Martin, 1997). Kota's (1997) study suggests that while positive affect is related to high achievement for boys, there is not a linear relationship between attitudes and achievement for girls, at least in the fourth form. The complexity of these findings indicate that attitudes, such as confidence, on their own will not explain the differential achievement and participation in mathematics.

Several models theorising the role of mathematics self-efficacy (confidence) have been proposed in the literature. For example, the relationship of gender, ethnicity, mathematics and science self-efficacy, with career interest in mathematics and science, was investigated in a recent study of 415 students in 11th grade classes attending 12 different high schools in large metropolitan area (O’Brien, Kopala & Martinez-Pons, 1999). On the basis of previous research suggesting that the influence of past achievement, gender and ethnicity, on career interest in mathematics and science was mediated by mathematics self-efficacy, the authors hypothesised that: ethnic identity and gender would independently contribute to career interest; that the influence of gender and ethnicity would be mediated by self-efficacy; and that mathematics and science self-efficacy would be influenced by past academic achievement in those areas (measured by Preliminary Scholastic Aptitude Test (PSAT)).

Participants’ mathematics self-efficacy was assessed, using a modified version of the Mathematics Self-Efficacy Scale (MSES), and their interest in mathematics and science related careers, using the a scale from the Jackson Vocation Interest Survey (JVIS). The MSES asks users to rate their confidence in their ability to complete successfully everyday mathematics tasks, number sequences (involving logical reasoning and concentration when using numbers) and mathematical problems (arithmetic, algebra and geometry problems), and also to rate their confidence in their ability to complete a number of university courses with a B grade or better. The JVIS presents pairs of activities, and asks users to indicate their preference (eg, learning a new branch in mathematics vs doing extra reading for a project).

Using path analysis (structural equations modelling), O’Brien et al. (1990) produced a model that accounted for 24 percent of the variance in students’ scores on the career interest scale. Gender was found to contribute independently to the variance, such that males were more likely than females to show an interest in mathematics and science related careers, although this effect was small. The influence of ethnic identity was mediated by self-efficacy scores, and self efficacy in turn was significantly correlated with career interest (0.38). Students with higher mathematics self-efficacy scores were more likely to be interested in pursuing a career involving mathematics and science. Past academic achievement was significantly correlated with self-efficacy and career interest. However, the analysis showed the relationship between career interest and academic ability was mediated by self-efficacy. The authors conclude:
While this study points to the importance of mathematics self-efficacy in mediating career interest in the mathematics and science areas, there were some interesting features of this study apart from those immediately concerning the authors. Gender was not significantly correlated with self-efficacy, or the PSAT-M, that is, there were no gender differences in mathematics self-efficacy or past mathematics ability for this group of pupils. While gender accounted for some of the variance in career interest as measured by the JVIS, this was not mediated by female students’ confidence in their ability in these areas. Irrespective of how confident female students felt about their mathematics abilities, they were less likely than males to demonstrate an interest in mathematics and science related careers.

The insignificant relationship between gender and self-efficacy in this sample is not surprising, given self-efficacy was related to achievement — no gender differences in achievement amounted to no gender difference in self-efficacy. This finding suggests that there is no gender difference in the belief in ability based on past performance; if so, this casts suspicion on the suggestion that females are less likely than males to believe their achievement in mathematics is due to their ability. However, given that the model proposed by O’Brien et al. (1999) only accounted for 15 percent of the variance in self-efficacy scores, and past achievement was only one of the significant explanatory factors, it is too early to dismiss the possible influence of other (not achievement) mediated factors in self-efficacy.

In addition, the model explained less than one quarter of the variance in career interest, leaving a large amount of unexplained variance. This finding points to the significance of factors other than those tested (self-efficacy and gender) being influential in students’ interest in mathematics and science careers.

Bohlin (1994) conducted a study examining the relationship between grades, learning styles and achievement on a standardised mathematics test in a sample of 397 16 year old students taking an Algebra class in 6 American Mid-West high schools. Three of the six scales of the Mathematics Learners Profile (MLP) were used to determine the learning style of the student. These measured: students’ confidence in situations calling for mathematical applications; conceptual understanding or cognitive restructuring; students’ interest in technology; and students' desire for structure in the learning environment. A high score on this scale is seen to be indicative of a relational learning style (conceptual, reasoned, holistic approach to mathematics which more easily allows for the applications to new situations), rather than an instrumental one (step by step approach concerned with rules and procedures).

While female students outperformed male students in Algebra I (but not Algebra 11 and geometry) to a significant level, they were less confident in several aspects of mathematics ability, taken to be indicative of a relational (compared with an instrumental) approach to mathematics. In addition, females scored significantly lower than males on the Preliminary Scholastic Aptitude Test-M (PSAT-M). These gender differences were found, irrespective of achievement in any of the three courses.

Females were also less interested in technical or maths applications related hobbies and careers, and displayed a greater need for structure in mathematics learning. The authors conclude that even though females do well in class, their lack of confidence, their preference for a structured learning environment, and their lack of interest in technology may affect success on standardised tests. It may also limit their participation in advanced mathematics courses requiring the acquisition or application of abstract mathematical concepts. They note that problems of the type presented in the confidence...
scale of the MLP are often those used in mathematics reasoning components of standardised achievement tests, (eg PSAT-M), which may explain why males do better in these tests.

Learning style was used in this study to refer to ‘relatively stable cognitive and affective behaviours that serve as indicators of how an individual perceives, and responds, to a particular learning environment’ (p.388). The results of the study are taken to indicate different learning styles of males and females in mathematics — whereby females prefer structure and shy away from mathematical tasks that involve a conceptual (as opposed to serial/rule following) understanding, and novel applications of maths. While learning styles are presented as relatively stable behaviours indicative of internally held perceptions of males and females, the interpretation and implications provided by the authors seem to suggest that learning styles may have more to do with behaviours traditionally thought appropriate to males and females than a stable cognitive structure: desire for structure, for example, was measured by such items as “When I’m solving a problem I like to have everything neatly organised” and “If a homework assignment seems trivial, I usually won’t do it”. A confounding of obedience with desire for structure?

Suggestions for improving the performance of females in mathematics include de-emphasising the memorisation of algorithms and rote learning — suggesting that girls' lesser ability or confidence in problem solving may be a function of them having learned their lessons too well, whereas boys greater ability in this area is a function of them breaking out of passively receiving knowledge to question concepts and subsequently apply them to new situations. An alternative explanation to the cognitive learning style hypothesis suggests gender difference in problem solving could be illuminated by looking at the types of behaviours that are ‘encouraged’ (taught/reinforced) for male and female students.

Furthermore, it is dubious whether items measuring confidence in maths, interest in technology-related careers, and a desire for a structured learning environment are indicative of a specific cognitive learning style per se.

Randhawa, Beamer and Lundberg (1993) produced a model using structural equations techniques that specified a mediating role of self-efficacy in the relationship between mathematics attitudes (eg, locus of control, enjoyment, anxiety, value of maths) and mathematics achievement, measured by a standardised achievement test. While both students' attitudes and students' self-efficacy predicted mathematics achievement, with self-efficacy as a mediating variable, the accuracy of the predictions produced by the model improved. Overall, their model predicted 52 percent of the variance in mathematics achievement scores. Those students with higher self-efficacy performed better than those low in self-efficacy.

While the model suggested by Randhawa et al. (1993) fitted the data of both the 177 males and 108 females in the study, it explained more variance in males' achievement than females' achievement. Whereas the pattern of relationships was similar for girls and boys, efficacy scores and attitudes had a stronger relationship with achievement for boys than for girls. Self-efficacy of females as measured by the MSES was lower than for males, as was female performance on a standardised mathematics test. However, there was no gender difference in performance on classroom assessment, or on any of the attitude scales. The authors suggest the difference in performance on the standardised achievement test may be due to efficacy and structural information processing between genders. However, on the basis of their model, they conclude that the lower scores of self-efficacy for females signal that females as a group are at risk in mathematics. They recommend that teachers should assure students (especially females) that they are capable, and encourage them to ‘venture forward in mathematics related study’ and that process-based instruction, rather than focusing on the correct answer could reduce the drastic impact of negative feedback.
Support for the role of confidence/self-efficacy in mathematics achievement also comes from a longitudinal survey based study of 60 students from 6th to 12th grade (mid-western city, US) (Tartre & Fennema, 1995). The study asked two key questions: (1) are there consistent patterns of gender difference for the cognitive and/or affective variables?; (2) is there a pattern of cognitive and/or affective variables which predict mathematics achievement for each gender? is the pattern the same for each gender? Affective variables included confidence, usefulness of maths, maths as a male domain and the effect of the teacher on mathematics performance. Cognitive variables included verbal skill, and spatial visualisation and orientation. Results of the cognitive domain are discussed in the following section.

No consistent significant gender differences were found for any of the cognitive or affective variables except for maths as male domain. Males stereotyped mathematics as a male domain to a greater extent than females. While there were essentially no gender differences in any of the cognitive and most of the affective variables, different patterns of skills seemed to predict mathematics achievement for boys and girls. Prior mathematics achievement was the single most consistent and strongest predictor of mathematics achievement for both genders at any grade level. Confidence for both genders was also consistently significantly related to mathematics performance. However, for females, less stereotyped views of maths as a male domain at grade 6 were predictive of achievement in later grades. Apart from confidence, none of the other affective skills contributed to males mathematics performance.

The self-efficacy of high ability children was investigated by Junge and Dretzke (1995). One hundred and thirteen gifted American students in grades 9 through 12 were assessed using the Mathematics Self-Efficacy Scale (described above). Statistically significant gender differences favouring males were found on 18 of the 70 items and favouring females on five of the 70 items. However, mean confidence rating for both genders were quite high on all items (above 5 on a 1-9 confidence scale).

Four of the five differences favouring females were found on the college course sub-test, where females were more confident in their ability to pass courses in comparative literature, dietetics, education and social work (not courses focused on mathematics). Males were significantly more confident in their ability to complete computer science, statistics and three of seven mathematics courses.

The fifth difference favouring females was found on an everyday mathematics task set in the context of grocery shopping. The authors suggest that overall, the mathematics confidence of gifted females was strongest on tasks involving traditionally female activities and weakest on mathematics-related college course-work. These findings are discussed with reference to the relationship between self-efficacy and familiarity with a task. Accuracy of confidence judgements are thought to be determined by past experience of a task — with more familiarity leading to more accurate judgements of ability. The authors suggest the gender differences found may be a function of each gender’s experience of a particular area. As the authors did not collect information about the experiences of the students in the study, nor any record of their actual ability, the relationship of efficacy to these factors can not be ascertained.

Frost, Hyde and Fennema (1994) note: (1) the general consensus among educators that gender differences in mathematics achievement exist; and (2) that a number of theories using attitude and affect variables have been used to account for these differences. To test the validity of both these assumptions, they performed a meta-analysis on 100 studies of mathematics achievement, and 70 studies of mathematics-related attitudes. Standardising the size and direction of gender differences between studies, Frost et al. calculated an effect size for each study (mean gender difference), and an overall effect for gender differences in mathematics achievement, and mathematics affect and attitude. In addition, several variables were correlated with the overall mean gender difference, in order to account for the variance in the distribution of mean gender differences. The results of the achievement
analysis are reported in the achievement section above and will not be discussed here. By way of reminder, Frost et al. (1994) found very small gender differences in favour of males, with some variation in the difference with respect to age, mathematics content area, and selectivity of the sample.

Frost et al. (1994) analysed gender difference for the Fennema-Sherman scales separately to those of other scales, as the former was used extensively in the literature. Fennema-Sherman devised 9 scales covering: confidence, anxiety, usefulness, math as a male domain, attitude toward math success, effectiveness, mother’s, father’s and teacher’s attitude towards mathematics performance. For these scales, average gender differences overall were very small (though indicating males, and mothers and fathers of males had more positive beliefs about maths performance), except for the scale maths as a male domain.

Interactions for these variables with age show that the gender difference in confidence, the belief in the usefulness of mathematics, as well as their mother’s and father’s attitude to a student’s mathematics performance tended to increase with age, in favour of males. However, with respect to the year of the study, regression analyses revealed males reported more positive attitudes among their mothers, fathers and teachers in the 1970s, while in the 1980s, this pattern reversed. The authors note that the analyses report relative differences only, so one cannot tell if attitudes to girls' mathematics became more positive, or attitudes to boys' mathematics became more negative.

The large effect for maths as a male domain indicates that males stereotype maths as a masculine activity more than females do (although this difference seems to be decreasing over time). The authors note that this finding suggests males may be discouraging females from participating and achieving in mathematics in a variety of ways, even if subtle ones.

Analyses of scales other than those of Fennema-Sherman included the variables of: general attitude toward math; math confidence; math anxiety; usefulness and enjoyment of math; attributions of math success and failure to ability, luck, task features, effort; and expectancy of maths success. As for the Fennema-Sherman scales, the average gender difference on each of these variables was very small. The tendency was for males to be more positive in their attitude towards and confidence in maths, and to attribute their mathematics success to their ability, especially among older males (15 and above). Females were slightly more likely to attribute their success to effort, features of the task or luck, and their failures to their lack of ability or task features. However, the number of studies used to calculate these effect sizes were small, especially when broken down by age.

Combining the Fennema-Sherman scales of mathematics self-concept/confidence and maths anxiety from other scales, and analysing them by age, showed small to very small gender differences for all age groups, with boys typically being more confident and less anxious.

The authors conclude that with the exception of stereotyping of maths as a male domain, the probability that any single mathematics-related attitude or affect can account for gender differences in maths is small. However, they do not discount the cumulative impact of attitudes, as they are consistently more negative among females. The small effects associated with attitudes and affect, and the small achievement differences, point to the operation of other processes limiting female representation in advanced maths courses and related occupations. The authors suggest discrimination in both education and employment may offer appropriate starting places.
DISCUSSION AND SUMMARY OF ATTITUDE RESEARCH

For the most part, the evidence with respect to attitudes is correlational. At best it could only indicate whether attitudes and affect towards mathematics were associated with achievement and participation. It could not indicate whether there was causal link, and if there was in which direction causality would flow.

Additional problems related to the use of several different scales to measure confidence, for example: the Mathematics Learners Profile (MLP), the Mathematics Self-Efficacy Scale (MSES), The Confidence Scale on the Fennema-Sherman Mathematics Attitudes Scales (MAS), all of which are designed to measure different aspects of mathematics attitudes from the general (MAS) to the specific (MLP). There is also some indication that mathematics confidence scales may be confounded by the types of items they include: for example, the Mathematics Learners Profile uses items from areas of mathematics that girls generally do less well in than boys. In addition, authors often modified or used sub-scales of these instruments for their own studies.

While it seems intuitively plausible that attitudes and liking for a subject could influence achievement (or vice-versa), the mechanisms through which these influences operate have yet to be determined. Convincing quantitative research would need to control for a variety of variables before any sort of relationship could be determined. Given the complex relationship among attitudes, affect, ability and achievement, it could prove more fruitful to examine their development in-situ, triangulating students own thoughts about confidence, liking and achievement in mathematics, with classroom processes, and standardised measures (see Boaler, 1997 below). Further, studies that actually ask what the students’ reasons are for participating or not participating in mathematics (see Johnston, 1994; Kenway et al. 1997 below) provide information that is directly based on students’ experience of mathematics in the classroom.

Notwithstanding these criticisms, confidence in mathematics ability emerges as a key explanatory factor in differential mathematics performance. Models have proposed both that mathematics self-efficacy mediates achievement (Randhawa et al. 1993), and that mathematics self-efficacy can be predicted from past mathematics achievement (O’Brien et al. 1990).

While several studies show females tend to have comparatively lower mathematical self-efficacy than males (Young-Loveridge, 1992; Bohlin, 1994; Junge & Dretzke, 1995; Randhawa et al. 1993), others have found no, or only very small, gender differences (O’Brien, V., Kopala, M., and Martinez-Pons, M., 1999; Frost et al. 1994; Tartre & Fennema, 1995). While these variations may be an artefact of the wide variety of tools and modifications of tools used to assess gender differences, the finding that both girls’ and boys’ achievement may be associated with self-efficacy suggests this maybe an important factor to consider in the teaching of mathematics (Randhawa et al, 1993; Tartre & Fennema, 1995).

This said, it is also worth noting that models including mathematics confidence as a predictor of participation and performance were unable to account for the majority of variance in their outcomes (that is, participation and achievement), which indicates that factors other than those measured in the studies play an important role in mathematics outcomes. Although strategies to improve the confidence of students could be of interest in the first instance, an analysis of the conditions that produce a lack of confidence is recommended.

Variables that were commonly connected to students’ self-efficacy, such as students' beliefs about their teachers’ and parents’ perceptions of their mathematics ability, found inconsistent support in the studies reviewed in this report. However, there was a small tendency for females to rate as significant others expectations of their achievement in mathematics lower than males (Forgasz & Leder; Frost et al. 1994). This may be linked to the consistent finding that mathematics is stereotyped as a male domain (especially by boys).

.../continued on next page
Discussion and Summary of Attitude Research (continued)

While the original stereotyping hypothesis contended that the perception of maths as a male domain deterred females from participating or achieving in mathematics (Haynes, 1994), the literature shows fairly consistently that males stereotype mathematics as a male domain to a greater extent than females (Tartre & Fennema, 1995; Frost et al. 1994; Forgasz & Leder, 1996; Leder & Forgasz, 1997). This had led some researchers to speculate that it may be the behaviour of males that deter females from full participation in mathematics (Frost et al. 1994). Other evidence suggests that students have different beliefs about themselves as learners of mathematics and English. For example, females believed that, compared with mathematics, in English they would attain higher marks and also, that their parents and teachers would assign them higher marks. Females were also more likely to attribute their English successes to their ability, compared with their mathematics successes. In contrast, there were no differences in males’ beliefs of their own or others ratings of their achievement in English and mathematics (Forgasz & Leder, 1996).

Findings discussed here also indicate that within mathematics classes, teachers may still be using contexts more familiar to males than females (Forgasz & Leder, 1999), although this was in an Australian study. In short, this evidence suggests that perceptions of mathematics as a ‘male’ subject, in which males may be expected to do well, but not females, may still be influential in females’ and males’ experiences of mathematics.

Another notable finding of the self-efficacy literature, not directly related to confidence, comes from studies using standardised tests as well as course grades as measures of achievement (Bohlin, 1994; Randhawa, 1993). While there was no gender difference, or differences favouring girls on course grades, boys performed better on the standardised tests. Researchers have linked this to the type of abilities assessed in standardised tests, suggesting they test domains of mathematics in which boys have been found to excel. This point is picked in the latter discussion of mathematics and assessment.

In summary, further research in the New Zealand context is required to determine how New Zealand students experience mathematics, whether there are systematic gender differences in these experiences, and how these produce gendered patterns of participation and to, a lesser extent, achievement.

5.6.1 Criticisms of Attitude and Attribution Theory

Within the last few years, a new literature has emerged in mathematics education, which suggests that theories such as ‘attribution theory’ lay too much blame with girls and women for their under-achievement or under-participation in mathematics, and not enough responsibility, with the wider school system (Johnston, 1995; Boaler, 1997). Attribution theories that explain girls’ failure in terms of their anxiety, lack of confidence or negative attitudes towards mathematics and recommend interventions that ‘change girls’ (see for example, Heller & Ziegler, 1996), often overlook the reasons for girls’ attitudes. These may lie in potential problems with mathematical epistemology, pedagogy and practice. The move is away from inward-focused deficit models of femininity and towards a critical examination of mathematics as a subject and practice.

In the next section, studies examining girls’ reasons for selecting or not selecting mathematics are reviewed. This section is followed by a discussion of research that takes students’ experiences of mathematics in the classroom as its starting point.

5.6.2 Participation in Mathematics: Girls’ Own Voices

In the absence of any locatable New Zealand research asking students for their reasons for avoiding mathematics, two Australian studies are reviewed here. These studies have the added advantage of providing evaluative data on the impact of communication strategies to encourage female students into mathematics courses.
Sue Johnston (1994) interviewed 240 grade 11 girls from 6 schools in two Australian states (Queensland and Victoria), to find out why they selected mathematics. Other personnel in the school, and girls' parents, were also interviewed. The most commonly cited reason given by all participants for continuing with mathematics at secondary school was that maths was needed to keep girls’ options open. This was in recognition of the fact that a large number of tertiary courses specified mathematics as a pre-requisite. Even when girls were undecided about their careers, or were not anticipating moving into a career involving mathematics, they were taking mathematics as a back up should their chosen courses fall through, or because they thought employers would be looking for it. For example:

‘I chose maths because I knew maths was the one thing that would help you get into uni. Maths is important. Every job, everything you want to get into has got maths.’ (p.238)

Many students cited television commercials played two years earlier in Victoria to encourage girls into mathematics “Don’t pigeon-hole your daughter”, “Maths multiplies your choices”. Even students who had previously bad experiences in mathematics classrooms felt compelled to take at least one form of mathematics.

Maths was chosen by many girls because they ‘needed it’ to follow through with their chosen careers. In general, it was girls with quite high career aspirations, and who were knowledgeable about how to achieve those aspirations, who cited this reason.

A small number of students were taking mathematics because they believed it was useful to their lives. Johnston (1994) notes that even though these girls argued that mathematics should be useful, not many of them thought the mathematics they were studying were helping them in this way. Yet another group gave no particular reason for studying mathematics, other than that they’d always done it.

Small groups of girls from each school had chosen not to take mathematics. For some, this was the result of previous bad experience that had left them unconfident, while others did not see maths as contributing to their future career aspirations. The latter group had often performed quite well in mathematics, and dropped it in the face of strong condemnation from parents and schools.

Across all participants, mathematics was seen as important; importance was linked to what mathematics could do for future options. Johnston (1994) notes that, in spite of misgivings about mathematics expressed by many girls, the vast majority were swayed by the argument about the importance of mathematics. While girls' negative experiences of mathematics could be seen reasonably to lead them to exclude it from their programme, they were taking it to keep their options open.

Johnston (1990) critically examined the arguments made for taking mathematics. Most notable was the inconsistency between official reasons for teaching mathematics related to its importance in everyday life, with the popular reason which construed maths as a needed stepping stone to greater things. The popular argument (and that used in promotions) recognised maths not for its intrinsic value, but for its role as a filter to future pathways. Johnston asks whether it is appropriate for a subject to hold this position, especially when many of the pathways which specify mathematics as a pre-requisite do not draw directly on the concepts which are used as a selection device.

Johnston (1994) argued that mathematics, when used as a filter, seemed to work as an indicator of general academic ability. This was exemplified in school practices that channelled students into mathematics options seen respectively as easy ‘vegie maths’ or difficult. While Johnston did not see the two types of mathematics offered as problematic in themselves, the hierarchy of maths resulted in students being labelled, and labelling themselves, as being brainy or dumb. She notes that in no other subject areas were aptitudes for the subject associated with perceptions of global intelligence, and in
no other subjects were students streamed into options that resulted in them being stigmatised. Johnston suggests a revaluing of mathematics so that status is not given to only one type, and concludes a critical examination is needed of the justifications for encouraging girls into mathematics, and of the practices and structures currently used for the subject.

Kenway, Willis, Blackmore and Rennie (1997) also provide a critical commentary on policies and practices used to encourage girls into maths. Interviewing year 11 and year 12 girls in a number of schools after Victoria’s 1990 communication campaign to encourage girls into mathematics, Kenway et al. found a number of responses among their interviewees. Among the more academic girls, the advertisements were seen as silly and belittling, as they already knew the message. For them, the advertisements implied that boys already knew what they were doing, but that girls needed to be kept on track. For other students, the advertisements provoked anxiety about their subject choices. Girls felt forced into choosing mathematics, thus making the right choice and proving themselves. In schools, the advertisements led to an increase in enrolments in mathematics courses amongst girls and boys, and a decrease in enrolments in other subjects; this led to staffing and resource problems for some schools. Teachers reported that in some cases, students who initially chose mathematics at the beginning of the year were switching to other subjects half-way through when they found that they were not coping with mathematics.

Apart from these difficulties, Kenway et al. (1997) are critical of the advertisements which:

> 'homogenised girls and their families and placed the responsibility for changes with the individual choices that girls and young women make. Indeed, the campaign in its entirety offered little to such young women that might take forward their understanding of how they came to make the choices they made, and what they might do about any associated issues.' (p.40)

Further research considering students' experiences in the mathematics classroom are reviewed next.

### 5.7 PEDAGOGY AND ENACTED CURRICULUM

Beginning in the 1970s, debate has continued around the question of whether boys and girls have different experiences in the classroom with respect to teacher-pupil interaction (Eccles & Blumenfield, 1985; Kelly, 1988) and also around the best method for teaching mathematics to achieve equity (Boaler, 1997; Baker & Leahy, 1992; Smith & Glynn, 1990; Crawford, 1988).

Summarising the literature of the 1970s and 1980s in a meta-analysis of teacher-pupil interaction, Kelly (1988) found that girls were consistently under-represented in every kind of teacher-pupil interaction. The gender difference was not large, but showed girls participated in 44 percent of classroom interactions. Boys were over-represented both in the area of behavioural criticism, and in teaching that went on in the classroom. With respect to specific subjects, in mathematics Kelly found the overall participation of girls was as great as in other subjects (46%), but they were markedly under-represented in instructional contacts (42%), compared with reading, science and social studies.

Evidence for continued differences in teacher attention and class participation are cited later in this review, in the context of the class-type literature. Compared with their experiences in co-educational classes, Australian girls reported they had more teacher attention in single-sex classes (Rennie & Parker, 1997). Limited support for the contention that girls and boys have different experiences of maths instruction was found in an New Zealand context by Smith and Glynn (1990).

Smith and Glynn’s (1990) observations of two classes provides one local source of analysis of interactions patterns in two form 1 mathematics classes. Teacher initiated interactions, responses and feedback, as well as child initiated interactions, responses and on-task behaviour were observed in 20
lessons for one mathematics class and 11 lessons for the other. While some differences in boys’ and girls’ interactions were observed, the authors concluded that the study could lend only modest support to the theory that boys and girls have different experiences in mathematics lessons.

Over both classes, teachers directed more control comments to boys, but this was the only common finding. In the classroom with a male teacher, boys received more teacher attention. Although this difference was not large, when extrapolated to an entire year, girls would have received 8 hours less attention in mathematics than boys. Girls received more responses from the teacher than boys in the class taught by the female teacher. Girls in both classes were more likely than boys to use non-verbal communication to initiate interaction (male teacher), and to respond to the teacher (female teacher). While the authors note it may be possible that teachers interact more with students of their own sex, the differences observed in their study could be the result of sampling variation.

While there was limited support for gender differences in learning experiences with regards teacher pupil interactions, the authors noted there was little opportunity for boys or girls to initiate learning interactions, and there was very little written or spoken feedback from the teacher, except with regards to work presentation. They conclude:

‘Teacher training strategies which encouraged teachers to make mathematics lessons into more responsive social contexts for children to learn would be likely to improve mathematics skills for both boys and girls.’ (p.15)

The importance of this final point is underlined by the research findings of Boaler (1997).

Boaler (1997) conducted a case study of two schools which used different pedagogical approaches to the teaching of mathematics, in order to provide sound classroom-based evidence to support the contention that pedagogy was instrumental to outcomes for girls. Her study is theoretically embedded in a critique of attribution theory which implicitly holds girls responsible for negative attitudes to schooling. Through observing, interviewing and surveying girls and boys in a longitudinal class-room based study, Boaler (1997) demonstrated how two different pedagogical approaches to mathematics effected the attitudes and eventual outcomes of girls and boys to mathematics.

Two cohorts of students in two different classes were followed for three years (year 9 age 13 to year 11 age 16). Qualitative and quantitative methodologies were used to gather data on the students’ classroom experiences and mathematics understanding. Schools were deliberately chosen to match student populations in terms of gender, ethnicity, social class, initial ability, and past pedagogical experience, with the key difference being the school environment and approach to mathematics. One school used a project-based, open approach to mathematics, where the philosophy was students should encounter situations in which there is a need to use mathematics (project-based school). Each project lasted approximately 3 weeks, with the students given a theme and then allowed to develop it in any fashion they chose under the guidance of the teacher. Students worked individually, in pairs or in groups.

In the other school, tradition in school organisation and classroom practice was highly valued, so a teacher-guided textbook, content-based, back-to-basics approach was used. This approach stressed the learning of methods and rules, with little discussion of the methods themselves; for example, why they were selected over possible alternatives. The text-book approach encouraged a ‘learning as quickly as possible and moving on’ environment. Students in the latter school had approximately 3 weeks in year 10 and year 11 when they were able to complete their own course-work, comprised of one investigation and one-open ended project (textbook-approach school).

Boaler (1997) found that throughout the three year study, both girls and boys in the textbook-approach school showed strong preferences for their coursework lessons and dislike of their text-book lessons.
For example, in a survey of year 10 students (n = 163), 65 percent of girls and 61 percent of boys named their course-work lessons as their favourite, and no students named their text-book lessons. The reasons for these pedagogical preferences were qualitatively different for girls and boys; Boaler linked the preferences to the different goals boys and girls had for mathematics learning.

For girls, reasons for preferring the course work in the textbook-approach school, and enjoying the project-based pedagogy of the comparison school, related to their desire to understand mathematics. An open, project-based approach allowed for greater time, discussion and understanding of mathematics concepts not available in the textbook-based approach. While boys also preferred course-work, they were prepared to overlook their lack of understanding in the textbook-based school, in the interests of finishing lessons quickly — a goal encouraged by the textbook approach.

Boaler notes that the concern for a lack of understanding was particularly acute among girls “not because they understood less, but because they appeared to be less willing to relinquish their desire for understanding and play the ‘school mathematics game’” (p.292). Features of the course-work or project based approach that girls particularly appreciated were the ability to take the initiative in their own learning, work co-operatively, and work at their own pace. Boys also appreciated being able to work at their own pace; however, their reasons for doing so related more to their ability to get ahead and complete as many books as possible.

The different pedagogical approaches impacted on the confidence and enjoyment of mathematics for girls more so than for boys, with girls at the textbook school reporting the lowest enjoyment and confidence of all students surveyed in the study; these different pedagogical approaches also ultimately impacted on the achievement of the students. At the end of the study, students sat their GSCE: the students of the project based school attained significantly higher grades than those at the text-book school. While there were no gender differences among students from the project-based school, significant gender differences favouring boys were found at the textbook-based school. The disaffection of girls and their poorer results, Boaler concludes, related to the conflict inherent in girls' valuing a pedagogical approach, and way of learning that was not available to them at the textbook approach school. While boys also preferred a more open, reflective style of learning, they were willing to forgo understanding in order to compete in a system that gave them high marks.

Significantly for the attribution arguments, girls in the textbook-based school found they were unable to improve their situation, not because of their own inadequacies, but because of their inability to change the pedagogical practices of their schools. The disaffection was not with the intrinsic nature of maths per se, but with school mathematics as it was commonly constructed. For example:

'Every report he writes, he writes good ability but lacks confidence, but I know that I can do the work — in a different situation, with a different sort of work.

Girl 1: Before I came to this school, I was really good at maths, but since I’ve come here I’ve got a lot worse.
Girl 2: Yeah, me too, I’m no good at maths now.
Interviewer: Why is that?
Girl 1: Well, cos I’m no good.
Interviewer: You’re no good?
Girl 1: No, well I could do the maths, but not like this.' (p.301–302)

Calls for changes to the way in which mathematics is taught were also made in New Zealand in the early 1990s (Smith & Glynn, 1990; Baker & Leahy, 1992; Baker, 1994). For example, Baker and Leahy (1992) wrote:
‘To achieve a curriculum where the position of each student has some significance, there needs to be a shift from learning about the subjects to doing them. So, rather than learning about mathematics or science, students need to be mathematicians and scientists. The content of the subject remains important, but not as an end in itself.’ (p.43)

However, a lack of classroom based evaluative research does not allow us to provide any commentary on mathematics teaching and gender outcomes in New Zealand at present.

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<th>SUMMARY OF PEDAGOGICAL RESEARCH LITERATURE</th>
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The research cited suggests boys and girls may have different experiences of mathematics curriculum in the classroom. Achievement and participation outcomes provided at the beginning of this chapter unequivocally support this contention; not only in relation to gender, but also with respect to students of different ethnicities, social classes and abilities. Studies such as Boaler’s (1997) provide an example of how conditions which lead to different attitudes, outcomes and preferences can be studied, although the tendency to homogenise ‘girls’ and ‘boys’ is a weakness of the research.

In light of the literature, the release of the *Mathematics in the New Zealand Curriculum* in 1992, with its focus on mathematics processes and problem solving, could be seen as a positive step forward for mathematics pedagogy. Ways in which the curriculum could be implemented to be more gender inclusive and more relevant for girls are discussed by Baker (1994), and outlined in the science section of this review. However, the influence of the new curriculum on teaching practice in New Zealand schools remains to be evaluated.

5.8 COGNITION AND MATHEMATICS — THE RELATIONSHIP OF SPATIAL ABILITY TO MATHEMATICS ACHIEVEMENT

The interest in spatial ability had its primary impetus in speculation that it was related to, or underpinned some or all aspects of, mathematical ability. Evidence of male superiority in spatial ability could therefore be useful in explaining gender differences favouring males in mathematics (Willingham & Cole, 1997). In order for this theory to prove useful, male’s superiority in spatial skills needs to be linked convincingly to mathematical tasks.

Linn and Petersen’s (1986; cited in Willingham & Cole, 1997) meta-analyses of 172 studies (1973-1982) examining gender differences in spatial ability tasks concluded that there were small to large differences favouring males, depending on the nature of the task. Tasks assessing *spatial visualisation* — where questions are presented in a spatial context, but can be solved through a series of analytic steps — showed quite small gender differences, favouring males. *Spatial perception*, in which males clearly had the advantage, included tasks that required accurate recognition of the vertical or horizontal axis, while tasks involving *mental rotation* in three dimensional space showed the strongest gender effect. While this analysis is getting old, it still seems to be authoritative in the literature. Note that although this analysis found significant gender differences with respect to some spatial skills, these were not linked to mathematics performance.

Willingham and Cole (1997) note that the evidence of the relationship between spatial ability and mathematics is far from clear. However, a meta-analysis of correlations of spatial and mathematical tasks, conducted by Friedman (1994), provides evidence that is not consistent with the theory that spatially-based skill underlies mathematical thought.

Friedman (1994) begins her analysis by discussing the findings of other meta-analyses that demonstrate gender differences in mathematics are small and seem to be decreasing over time (see Friedman, 1989 and Hyde at al., 1990 discussed above). This decrease in gender difference in mathematics does not seem in line with the reported gender difference in spatial ability. Friedman also
reviews the various hypotheses about which areas of mathematics are dependent on spatial ability, stating that the evidence that has been brought to bear has been either introspective or correlational, and does not all lead to the same conclusions.

Friedman’s meta-analysis was based on studies conducted since the 1950s. Mathematical tests were broken down into high-level and low-level tests. Low-level tests included computation or simple conceptual distinctions, and high-level tests included more complex conceptual tasks with applications or problem solving. Spatial tasks were broken down into orientation and visualisation categories. Orientation tasks involved transformations of whole objects. For example, distinguishing a reflection from a rotation of a two-dimensional object, or identifying from a group of drawings, the same three-dimensional object that had been rotated. Visualisation tasks were those that could be solved by breaking down the tasks into steps. For example, identifying a figure that is the folded version of a plane or two dimensional drawing (eg, a 3D box from a flattened box).

The analysis produced weighted average correlations between maths tests and the spatial tasks, most of which were at best moderate in size (0.2–0.45). Where studies provided the information, Friedman analysed correlations between verbal and mathematical ability and found that average correlations for this ability were always higher than space-maths correlations (as high as 0.63). Correlations did not generally become stronger with age.

With respect to areas of mathematics where gender differences are sometimes found she writes:

‘calculations made in mathematical areas displaying gender differences in achievement suggest that spatial skill will not explain these differences. As geometry-space correlations are low, spatial skill is not a likely explanation for gender differences in geometry achievement. Problem-solving skills are a subset of high-level maths skills, and these do not correlate highly with spatial skills.’

(p.369)

As discussed in the attitude section above, Tartre and Fennema (1995), in their longitudinal study of a small sample of American students, asked two key questions: (1) are there consistent patterns of gender difference for the cognitive and/or affective variables?; (2) Is there a pattern of cognitive and/or affective variables which predict mathematics achievement for each gender? Is the pattern the same for each gender? Affective variables were discussed in the attitude section. This section presents findings related to cognitive variables, including verbal skill and spatial visualisation and orientation.

No significant gender differences in achievement were found for students in the 6th, 10th or 12th grades. A small but significant achievement difference in favour of boys was found in the 8th grade. No consistent significant gender differences were found for any of the cognitive variables at any grade. While there were essentially no gender differences, different patterns of skills seemed to predict mathematics achievement for boys and girls. As previously noted, prior mathematics achievement was the single most consistent and strongest predictor of mathematics achievement for both genders at any grade level. Spatial visualisation skill also emerged as a significant predictor of female performance, but not verbal skill. For males, spatial skills were not part of the predictive equations for males at any year, but verbal skills were. In short, spatial skills were implicated in girl's mathematics achievement while verbal skills were associated with boy's performance.

In conclusion to their research , the authors note it would be premature and perhaps damaging to indicate spatial skills should be taught to eradicate gender differences in mathematics because: ‘that idea is based on the assumption that there are gender differences, and helps perpetuate the stereotyping of these activities by gender” (p.215)
SUMMARY OF COGNITION RESEARCH

The relationship of spatial skills to mathematics achievement has not been consistently supported in the literature. The likelihood that improving girls’ spatial skills as a remedy for the closing gender gap is at best suspect, especially given: (1) that the mathematical domain of ‘problem solving, where girls may be weaker, appears to be unrelated to spatial skills; and (2) the mathematics gender gap is closing and non-existent in some studies.

5.9 ASSESSMENT OF MATHEMATICS

Blithe, Clark and Forbes (1993) and Clark, Forbes and Blithe (1994) provide an overview of gender differences in mathematics arising from assessment methods in the international and New Zealand literature, and report on their own research investigating gender differences in internal and external assessments. While concluding that assessment of mathematics performance should include a range of different procedures to genuinely measure various mathematical abilities, these researchers note a number of assessment procedures which favour either males or females. Examples from New Zealand studies and more recent international research are cited below.

5.9.1 Choice and Content

Within the context of traditional mathematics exams, males and females have been found to choose different questions from different areas of mathematics. For example, in Bursary Mathematics with Statistics, females prefer statistics rather than general mathematics questions (Forbes et al, 1990; Morton et al. 1993 in Clark et al, 1994) and in first year University statistics courses females prefer and score better in questions set in people or environment contexts (Blithe et al, 1993).

In terms of achievement, Blithe et al (1993) reviewed a number of international studies, that taken as whole, seemed to suggest males tended to do better in mathematics tasks involving problem solving, applied maths (eg, measures, rate, ratio) and geometry, whereas females tended to do better on tasks involving computation and algebra.

Further support for the relative areas of competency of males and females comes from Willingham and Cole (1997), who reviewed a number of large American studies in the context of gender and mathematics assessment. Their findings indicate that with age, there is increasing gender differentiation in mathematical ability with:

‘females tending to score higher on computation, little difference on general knowledge of mathematics, and males tending to score higher on problem solving and reasoning, which are emphasised more at higher levels of training.’ (p.288)

The contribution of problem-solving tasks to the better performance of males in senior school mathematics is problematic. Males have been found to have a more variable performance in mathematics, with more males at the tail ends of the distribution. For example, Willingham and Cole’s analyses of mathematics performance shows males’ performance is typically more varied than that of females. This variability has also been found in a longitudinal study of mathematical problem solving in Iowa (Becker & Forsyth, 1994), and in the distribution of mathematics scores in Sixth Form Certificate in New Zealand (Forbes et al, 1990).

However, it is not clear whether this variability in mathematics performance is due to the difficulty of the tasks or to the various strengths of males and females in different mathematics competencies. Problem solving tasks at which males do well tend to be more difficult than computational tasks at which females do well. Thus performance variability is confounded with the nature of the task, such that it is difficult to tell whether gender differences at the high performance end of mathematics
distributions are a function of problem-solving tasks, or whether gender differences in mathematics tests result in gender differences in problem-solving (the more difficult items).

In the New Zealand context, patterns of gendered achievement in the TIMSS data for form 3 students and students at school leaving age support the pattern of relative strengths outlined in the international findings to some extent.

Clark et al. (1994) note the significance of these findings in the context of the emphasis in “Mathematics in the New Zealand Curriculum”. The emphasis on problem-solving in the curriculum (also a current international trend) may disadvantage females.

Findings for question context and content may be important to exam layout. Forbes et al. (1990), Blithe et al (1993) and Clark et al (1994) report there is a tendency for students to answer questions in the order they’re given; presenting students with non-preferred options, or weaker options first, may deter students from answering questions that they may score better in. Weighting exams in favour of questions that are not preferred by some groups of students may also impinge on their achievement.

In sum, tests of mathematical ability stressing areas where either males or females have been found more competent may result in gender differences. This raises questions of the relative values ascribed to some forms of mathematics and not others.

5.9.2 Format

Free Response items

There is some suggestion in the literature that females perform better than males in essay-type questions, or free response questions. For example, in New Zealand Bursary maths with statistics, males do better than females overall, but one of the two questions in which females outperformed males was in essay-style questions in 1987 and 1988 (Morton et al. 1993; cited in Clarke et al. 1994).

Willingham and Cole (1997) investigated the effect of free-response formats, and multiple choice formats, in national and state-wide testing regimes in the United States, England, Britain and Queensland, Australia. They defined a format effect as a discrepancy in the gender difference of a free-response tests, compared to the gender difference on a multiple-choice test, in the same subject for the same sample of students (note essay style questions were not the only formats considered in this study). Their findings show that, while females were more likely than males to do better on free-response formats compared to multi-choice formats, this effect was not consistent. Format effects tended to vary across subjects — and were seldom found in mathematics or in language and literature. Their appearance in subjects in science and geo-politics, they speculate, could be due to the different skills within the subject tested by the different formats. A free-response format effect favouring females often appeared where writing was involved, while a free-response format effect favouring males tended to occur when figures where involved.

Multiple-Choice

While Blithe et al. (1993) stated that international research shows males are favoured by multiple-choice questions, contrary evidence has been found locally. (This has been linked to females being less likely to risk giving a wrong answer, and males being more likely to guess). In an analysis of response patterns between multiple-choice items and free-response items among Form 2 and Form 3 in the TIMSS, Chamberlain (1996) concluded that there was no evidence to support the contention that males were advantaged by multiple-choice formats, or that females were advantaged by the free-response format. In the standard 2 and 3 TIMSS mathematics results, girls did slightly better than boys on questions using both multiple-choice and free-response format (Chamberlain, M., 1997).
In a review of 14 studies examining the outcomes of multiple-choice formats on the same content, assessed by short free-response formats, or if there was a gender difference in the outcomes produced by different formats, Willingham and Cole (1997) concluded that multi-choice format itself did not have an effect on performance. Rather, outcomes depended on what was measured.

Support for this finding was found in a recent study involving 3952 11th grade pupils by Garner and Engelhard (1999). In their examination of responses to a mathematics test administered state-wide, females showed a statistically significant and consistent advantage on items involving algebra, while males showed a less consistent advantage on items involving geometry, measurement, number and computation, data analysis and proportional reasoning. The algebra items included no real world situations or word problems; this leads the authors to conclude that females would benefit more than males on instructional strategies that rely less on teaching algorithms, and more on teaching problem-solving, and ways of approaching non-routine problems.

5.9.3 Internal vs Examination Assessment

Willingham and Cole’s (1997) review of mathematics outcomes in course grades, compared with mathematics tests, showed females tended to gain higher course grades than males, while males tended to have better outcomes relative to females on mathematics tests (eg, SAT). This discrepancy was consistent across different mathematics tests and different large samples (see for example, Randhawa et al. 1993 and Bohlin, 1994 cited earlier).

The effect of course-assessment versus exam assessment was examined in New Zealand by Blithe et al.,(1993) and Clark et al. (1994). These researchers compared male and female achievement in School Certificate external exams with their performance in Sixth Form Certificate mathematics for the years 1991 and 1992. While the overall trend in participation was that students with higher marks were more likely to go on to do Sixth Form Certificate Mathematics, they found females were less likely to continue with mathematics, regardless of their School Certificate grades. With respect to achievement, given similar grades in School Certificate Mathematics, females were likely to achieve significantly higher grades than males in Sixth Form Certificate. This pattern was consistent for Maori and non-Maori males and females.

The second reported study compared male and female achievement in the internally-assessed and exam-assessed components of Bursary Mathematics with Statistics. Significant gender differences were found to favour males in the final mark and for the exam component, while females scored significantly better on the internally-assessed component. Because the internally-assessed mark is moderated by the exam component, and more weight is given to the exam (by 4:1), the overall gender difference favours males. Within schools, females were more highly ranked in internal marks while males were more highly ranked in exam marks. On the basis of these studies, and those conducted within University courses (not reported here), Clark et al. (1994) and Blithe et al. (1993) conclude that internal and exam assessment advantage different groups – with females in particular doing better in internal assessment than written examination. They further conclude that there appears to be little justification for moderating internally-assessed components by examination.

While not employing the same control for ability as Blithe et al. (1994), Praat examined differences in outcomes of students sitting School Certificate Mathematics by examination compared with internal assessment. Both males and females appeared to do better when assessed by examination. However, while the form of assessment produced very slight differences in outcomes for females, those of males were more markedly affected. The proportion of males attaining a C grade or better in the internally-assessed group was between 4–7 percent less than males in the exam-assessed group from 1994–1997.
SUMMARY OF ASSESSMENT

Within the context of mathematics, the format of test items does not seem to be implicated in gender differences in performance. The weight of evidence suggests that girls receive higher marks in course grades and internal assessment compared with standardised tests, although these findings may be confounded with the content of assessments (at least overseas). The effects of context and content of test items suggests assessment should include examples likely to be familiar and relevant to a broad range of students.

5.10 PARTICIPATION AND ACHIEVEMENT IN MATHEMATICS EDUCATION IN SINGLE-SEX AND CO-EDUCATIONAL SCHOOLS

The interest in school type derives in part from a perception that single-sex schooling produces better achievement for boys and girls. In the case of girls, single-sex schooling is thought to enhance girls’ learning by removing them from a co-educational environment in which boys dominate teacher time, class-room space, and generally contribute to a less than ideal learning environment for girls (Haynes, 1994). With recent concern about the education of boys, some schools in New Zealand have tried single-sex classes for boys (see, ERO 1999). The success of these classes has yet to be evaluated.

Available evidence suggests the advantages and disadvantages of single-sex and co-educational environments may be expressed in outcomes other than achievement. This section reviews studies looking at a range of outcomes with respect to school type and mathematics.

Using 1990 secondary school examination data, Sturrock (1993) analysed the participation and achievement of male and female students by school type. She found proportionally more females and males in single-sex schools participated in externally assessed mathematics for School Certificate, and also attained a grade of B2 or higher in this subject.

While there was not a marked difference in participation in mathematics for Sixth Form Certificate between girls in single-sex schools and co-educational schools, girls attending single-sex schools were more likely to perform well in mathematics. Boys at single-sex schools were more likely to choose mathematics for sixth form certificate, but performed on a par with boys from co-educational schools.

Participation rates of males and females in Bursary Mathematics with Statistics, and Mathematics with Calculus, were not markedly different. However, females and males at single-sex schools were more likely to achieve well in Bursary Mathematics with Calculus. Although there were some apparent differences in participation and achievement of students attending single-sex verses co-educational schools, Sturrock warned that socio-economic status is a confounding variable in such analyses. She cites Hunter (1988), who demonstrated that individual characteristics of schools, apart from their type, influence the participation and achievement of students. The effects of school type and other student-related variables on achievement were investigated in a large sample of New Zealand students by Nash and Harker (1997).

Using data gathered from an initial cohort of over 5000 students in 1991, Nash and Harker (1997) investigated whether school type made a difference to the average achievement of girls in maths, science and English at fourth Form and School Certificate level. They concluded that, once the initial ability, and social and ethnic mix of fourth Form students attending single-sex compared with co-educational schools was controlled for, there was no significant advantage accruing to girls in single-sex schools in School Certificate mathematics, science and English, achievement or standardised tests in these subjects.

These findings are mirrored in a review of British evidence on the school-type question. Arnot, Gray, James, Rudduck and Duveen (1998) conclude:
'the apparently superior performance of single-sex (and especially girls-only) institutions, in terms of overall measures of examination results, has been largely due to the initially superior performance of the pupils entering these schools. When the different nature of the intakes of the schools has been taken into account, the differences usually disappear.' (p.46)

While these studies have concentrated on achievement of pupils from different school types, the literature on single-sex classes has often taken a broader approach to assessing the impact of a single-sex versus a co-education environment.

5.10.1 Single-sex Classes

Streitmatter (1997) conducted an exploratory observational and interview-based study of risk-taking and attitudes of girls in a single-sex mathematics class within a co-educational school. While acknowledging previous research on single-gender education had generally suggested little was to be gained in achievement or attitude toward schooling by separating boys and girls, Streitmatter noted the absence of systematic qualitative research that examined the effect of participation in a single-sex class on girls’ sense of confidence, career aspirations, and their sense of invisibility in co-educational classes. These are factors that could help to explain the documented decline of girls’ confidence in abilities, and participation, in mathematics as they go through middle school.

The class was set up as an experiment by the principal of the school with 24 high-achieving girls selected to take part in the class. Streitmatter followed the class of predominantly European/American middle-class girls across 7th and 8th grade, collecting 30 hours of in-class observation notes and 20 student interviews. Classroom behaviour of girls in the single-sex class was compared to that of girls in a mixed-gender class taught by the same teacher immediately before the single-sex class.

Although these classes were not directly comparable for a number of reasons, observational findings indicated that in the single-sex environment girls were more likely to volunteer information and ask questions, even when wrong. The single-sex class was characterised by constant noise (mostly math-related), which the authors relate to the confidence of girls who worked through problems out loud, and called for teacher attention. Interviews backed up the observations, with girls reporting they did not worry about looking or feeling stupid in the single-sex class, which encouraged their vocal participation. Several girls reported they had gained a confidence in their mathematics abilities, which they had not had previous to the class.

Rennie and Parker (1997) reported on the perceptions of 300 students, and 17 maths teachers, from four co-educational schools, running single-sex and co-ed maths classes. Schools and students were involved in the Single-Sex Education Pilot Project (SSEPP) set up by the Western Australia Education Department following recommendations made in Australia’s National Action Plan for the Education of Girls (1993–1997). Quantitative data from an instrument measuring 5 aspects of learning and instruction in the classroom, as well as open-ended responses were collected from students, and a range of qualitative data was collected from teachers. Students and teachers had all experienced single-sex and co-ed mathematics classes in the two years previous to the data collection. They reported on their experiences in both environments in the study.

Student questionnaire results indicated that male and female students had quite different perceptions of the single-sex and co-education mathematics classes. While not perceiving any differences in their attentiveness in co-ed and single-sex classes, girls thought they participated less and received less teacher attention in co-education classrooms. They also believed they had less student support in co-ed classes and received more harassment. Boys did not report any differences in their participation and interactions with teachers in co-ed compared with single-sex classes. In contrast with girls, they...
reported less collegial support and more hassle in single-sex classes, and also perceived themselves to be less attentive.

Open-ended student responses indicated girls tended to prefer single-sex environments while boys favoured co-education environments. While both male and female students reported that being able to get on with their work was an important aspect of the classroom, girls were more likely to indicate this happened in single-sex environments. Boys thought this occurred in co-ed environments. With respect to classroom management, the major issue identified was the disruption associated with single-sex boys’ classrooms and the disruption to mixed-sex classes by boys.

Analyses examining the relationship between students’ perceptions of the single-sex and co-education classes, and grades assigned by the school found no statistically significant differences. While achievement could not be linked to perceptions of the type of class, there was a tendency for more positive perceptions of the learning environment to be associated with higher grades, most particularly for attentiveness, teacher interaction and participation.

Students' perceptions were mostly congruent with their teachers’ reflections. All-girl classes were considered easy and enjoyable to teach, with teachers being able to utilise opened-ended problems, group work and discussion — strategies that could be used in mixed sex classes in a limited way. Teachers saw the behavioural problems of single-sex boys’ classes as stemming from two problems: (1) the poor communication skills of some boys, and their inability to work co-operatively together, and (2) the mismatch between task difficulty and student ability. Disruption from boys who were not able to complete set tasks, and were unwillingly to ask for help (which they usually received from girls), was a problem for boys of low ability, while high ability boys got bored. Teachers dealt with these issues by structuring tasks to assist boys to develop their literacy skills, and learn to work cooperatively. Changing task difficulty to meet the abilities of students helped to ameliorate the second problem. Rennie and Parker (1997) report that in most cases, initial difficulties with boys-only classes were considerably improved by the end of the year, with teachers being able to keep students on task. In some cases, boys-only classes were abandoned altogether because of their unmanageability.

Rennie and Parker (1997) identified the diversity of responses to the environments by boys, girls and teachers as an important finding of their study. They noted that while their averaged findings were consistent with the literature, they glossed over a variety of reactions:

‘For example, there is a tendency for the proponents of gender-inclusive practice to say that girls prefer cooperative work rather than competition. Certainly girls were better at cooperative work than boys, but many girls in this project enjoyed competition among themselves, and also with the boys, and they missed it in their single-sex class.’ (p.271)

The implications for gender-inclusive practice the authors see arising from this study are for teachers to find ways of implementing strategies that work for boys and girls into their co-educational classes.

Marsh and Rowe (1996) provide a critical re-analysis of a study comparing single-sex and co-educational mathematics classes within a co-educational school (Rowe, Nix & Tepper, 1986; Rowe, 1988). In the original study year 7 and year 8 students at a Victorian co-educational school were randomly assigned to single-sex or co-educational mathematics classes. This design sought specifically to address previous problems with research in this area which failed to take account of student variables (eg, ability) that confounded the effects of school type. Students were pre-tested and post-tested on measures of mathematics achievement, mathematics affect and subsequent mathematics participation.
In the original study, Rowe Nix and Tepper (1986) reported positive effects on achievement and attitudes of year 7 boys and girls in the single-sex classes compared with those in co-educational classes.

Rowe (1988) analysed the result of year 7 and year 8 pupils, both after a year in the intervention classes and in the following year (2nd year). No gender differences in achievement or confidence were found. Other findings revealed no class-type effects for achievement, while students in single-sex classes were more confident after a year, and also when tested in the following year (2nd year), compared with the baseline measurement.

Marsh and Rowe’s (1996) re-analysis focused on whether the effects of the randomly assigned intervention differed for boys and girls. It also focused on differences in results of the initial random assignment of students to class-type, compared with students self-selection of class-type. These re-analyses stemmed from Marsh and Rowe’s criticism of the 1988 study, where measurements taken in the 2nd year of the intervention were not based on the original random assignment of students to class-type. In the second year of the study, students had voluntarily moved into different classes because of time-tabling clashes, or had provided incomplete data.

Results of the re-analysis of the 1986 and 1988 data showed no significant effects of class-type for achievement of boys or girls in single-sex or co-educational classes. However, boys and girls in co-educational classes reported significantly larger positive changes in beliefs about equality of the sexes in mathematics compared with boys and girls in single-sex classes. Boys attending single-sex mathematics classes scored significantly larger gains in confidence than boys in co-educational classes. There was not a significant difference in the strength of the mathematics confidence of girls in co-educational, compared with single-sex, classes.

Analyses of the impact of attending single-sex or co-educational classes on achievement and affect in the 2nd year cohort of students showed no significant relationship. However, the type of class that students were in at the time of the 2nd year testing was significantly associated with outcomes: single-sex classes were associated with better achievement and higher levels of confidence. Because the groups in 2nd year were not randomly assigned, it was not appropriate to make causal linkages between class type and mathematics outcomes.

Marsh and Rowe (1996) conclude, on the basis of their re-analyses, that the class-type intervention had relatively little effect on mathematics achievement and attitudes, and at least some of the significant effects favoured mix-sex classes.

Leder and Forgasz (1997) reported an evaluation of the single-sex mathematics programme at a Victorian co-educational high school (grade 10), with special attention to parents’ views of the programme. Their 1996 evaluation was compared with the first evaluation conducted in 1993. Speaking of the first evaluation, the authors note that, while it was expected that girls would benefit most from the programme, their evaluation did not provide unequivocal evidence that the single-sex classes themselves ameliorated gender differences; there were signs that males rather than females derived more benefit from the programme.

In comparison to the 1993 evaluation, Leder and Forgasz reported that there was less support for the programme among parents, although more parents supported it than opposed it, overall. They also reported a trend for male students to be conceived of as the disadvantaged students in the later evaluation, rather than female students.

In 1996, females were more likely than males to report they liked their single-sex classes, and that they wanted them to continue into the following year, although the proportions responding thus were quite low (males 8%, females, 34%; males 11%, females 20%). Reasons given by girls for liking the
single-sex environment related to their inhibition to ask questions, and that they liked having no disruptions from boys. Girls who did not like the classes gave reasons of the increased noise in single-sex classes that disrupted their work. Boys who disliked the single-sex classes also mentioned the greater disruption in them and the ameliorating influence of the girls.

### SUMMARY OF SCHOOL-TYPE AND CLASS-TYPE RESEARCH

As for the school-type research, the evidence on class-type seems unrelated to achievement on the whole. The differences in these environments seem linked rather to attitudes and behaviour. Single-sex classes for girls and boys have been associated with more confidence. Girls have a stronger preference for single-sex classes than boys; with associated issues being those of more teacher time, and increased participation and confidence. Problems cited for boys in single-sex environments stem from the greater disruption in boy's classes. In the only study where boys and girls were randomly allocated to class-type, thus controlling for possible confounding variables, no significant class effects were found for achievement or students confidence, except for an increased tendency for boys and girls of both sexes to believe in equal opportunity.

The lack of consistent findings suggests that factors apart from class-type are important to achievement and participation. The variety of student responses in Rennie and Parker’s (1997) study suggest a single-sex environment might be the preference for different groups of boys and girls, rather than a strategy that can be neatly applied with equal benefit for all students. In addition, their work implies a variety of teaching strategies to meet the requirements of various students could result in more effective and equitable co-educational environments.

### 5.11 CONCLUSION

As was the case in science, New Zealand and international research into gender in mathematics have focused on girls and their relation to curriculum, texts, and pedagogies rather than boys. While in some literatures, girls are positioned as in deficit, for example in their lack of confidence in mathematics, these issues are increasingly being constituted and addressed (at least internationally) through attention to classroom practice, and the content of mathematics (eg, Boaler, 1997). Is mathematics inclusive of girls, as required by the Mathematics in the New Zealand Curriculum? The breakdown of gender statistics by ethnicity and social class indicate that the mathematics experiences of girls and boys are diverse, and that inclusivity ranges beyond the gender divide.

There is a consistent finding that boys are more likely to stereotype mathematics as a male domain, and indications that girls are less likely to think that significant others rate their ability in mathematics. These raise questions about the influence of constructions of mathematics on the identities and choices of boys and girls. As was noted in the science section, given the behaviour of (some) boys in mathematics classes has been problematic for (some) girls, the absence of research focused on boys is surprising. The implications of the construction of mathematics as masculine, and the impact of this on classroom relationships and choice, may be worthy of further attention.

Finally, while theories linking gender differences in attitudes and subsequent mathematics performance find only mixed support in the literature, it is worth noting that in New Zealand research, girls seem to have less positive attitudes towards mathematics starting at the beginning of secondary school (Martin, 1996) if not earlier (Young-Loveridge, 1992b, although the NEMP and TIMSS findings contradict Young-Loveridge’s work). These findings raise questions about girls’ experiences of secondary school mathematics, and also suggest that at least some girls may be doing well in mathematics despite not enjoying it or feeling confident about it. Australian research suggests girls continue in mathematics at the senior level because it is linked to future career options. If this is indeed the case in New Zealand, we need to ask is this good enough, given that one of the goals of the curriculum is to instil in students a belief in mathematics.
SUMMARY OF RESEARCH INTO GENDER DIFFERENCES IN MATHEMATICS EDUCATION

International research suggests the gender gap in mathematics achievement is very small and closing over time.

In international comparisons, both New Zealand boys and girls perform below the international average for ages 9 and 13 years but perform above the average at school leaving age. However, the literature shows a wide diversity in the patterns of mathematics achievement of boys and girls by ethnic identity and social class. While mean achievement of boys and girls at primary school shows little variation by gender, patterns of difference by social class and ethnicity indicate that the education of boys and girls from families with low SES, Māori boys and girls and Pacific boys and girls should be educational priorities. In addition, Young-Loveridge’s (1992) research indicates the education of students in lower ability groups, particularly girls, require attention.

While the differences between ethnic groups remain a feature of achievement data through secondary school, gendered achievement patterns are evident in the senior secondary school examinations. As students move through secondary school, boys are increasingly more likely to choose mathematics. Thus, comparisons of achievement between genders become increasingly more tenuous.

Notwithstanding the higher achievement of females across the board at Sixth Form Certificate, and differences in participation rates, males achieve to a slightly higher level in School Certificate, to a higher level in Bursary Mathematics with Statistics, and markedly better in mathematics literacy (TIMSS) at school leaving age. The exception to this pattern is achievement in calculus, where there is very little average gender difference (although it is statistically significant), except that favouring Māori and Pacific boys.

Patterns of achievement on various content and performance expectations (also called cognitive complexity in the literature) appear to be different for boys and girls from the beginning of secondary school. By school leaving age boys’ relative strength in areas such as problem solving had become more pronounced. This trend was observed in the international literature.

Research on the level of teacher education and student achievement for mathematics show that higher levels of qualification (eg, masters degrees) and teaching experience are positively correlated to mathematics outcomes.

Attitude and affect findings with respect to mathematics achievement are mixed, though the stereotype of mathematics as a male domain, and confidence in mathematics, may play a role in participation and achievement of boys and girls. Rather than ‘fixing the student’, the literature suggests using pedagogies that are relevant and useful to students.

Assessment research suggests assessment tools should include items that are familiar and relevant to a broad range of students. While there is evidence to suggest an effect on achievement stemming from the form of assessment (internal vs exam assessment), further research is required to determine if it is a case of girls doing better in internal assessment or boys doing worse, when internal assessment is compared to examination outcomes. Standardised tests should include mathematics items reflecting areas that students from different groups do well in.

Implications for practice and policy

Of the three curriculum areas for which international comparisons of achievement at primary level are available, mathematics creates the greatest concern. On average, New Zealand girls and boys are doing poorly. This finding makes mathematics education at primary school a priority.

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New Zealand process-based research about gender and mathematics is scarce. While outcomes and indicators suggest where gender differences exist, they do not illuminate how the differences are produced. In addition, the vast international literature, heavily influenced by psychology, uses ‘top-down’ research methods, speculating about the cause of gender difference without taking into account what students say about their experiences. Further gender has been theorised without making explicit the differences in experience of students of different ethnicities or social classes. Without this evidence, it is difficult to make any recommendations regarding policy or practice. However, it does suggest possible fruitful avenues of research.
Chapter Six: Language and Languages Curriculum: English Literacy and Oracy

‘The individual subject is understood at one and the same time to be constituted through social structures and through language, and becomes a speaking subject, one who can continue to speak/write into existence those same structures through those same discourses. But as a speaking subject they can also invent, invert and break old structures and patterns and discourses and thus speak/write into existence other ways of being.’

(Davies, 1993, p.xviii)

The English in the New Zealand Curriculum statement was published in 1994. English in the New Zealand curriculum has been integrally linked to the development of New Zealand students’ identities, culture and social participation:

‘Language is a vital medium for transmitting values and culture. Confidence and proficiency in one’s first language is a vital medium for transmitting values and culture. Confidence and proficiency in one’s first language contribute to self-esteem, a sense of identity and achievement throughout life.’

(Ministry of Education, 1996,p.9)

‘Language is integral to the development of identity. There is a close link between the ability to control the different functions of language and the learners’ own personal, social, intellectual, and imaginative development. The ways in which learners view the world are moulded by their language development.

‘English language programmes should enable students to communicate their own ideas and responses and develop confidence in themselves.’ (p.10)

The English curriculum statement provides explicit mention of gender issues in relation to both girls and boys:

‘Although girls are more successful than boys in English at school, their attainments in English are not always transferred into the full range of vocational training and employment options’. (p.13)

‘Boys and girls are both disadvantaged by the ways in which oral, written and visual language can create, reflect, and reinforce gender stereotyping.

‘The programme should provide a supportive learning environment, in which girls and boys receive equitable access to resources, including teacher’s time and attention, technology, learning assistance, and a range of roles in group activities.’ (p.13)

6.1 APPROACH TO THE REVIEW OF RESEARCH ON LITERACY

That language is so central to identity raises an issue about the role of English language and literacy for students whose cultural traditions arise out of other languages. Cummins (1986) reviewed a broad range of international research, indicating that students achieved more highly when they had opportunities to learn within an environment that supported their indigenous or cultural language. When such opportunities were available and well-resourced, students not only did better within their
own/cultural language, their achievement within the language of the dominant culture in their country was also higher. Further, such opportunities enhanced identity and well-being, and enabled children the human right to learn within their own cultural and language traditions in their home country.

Carkeek, Davies and Irwin (1994) found the well-being of Māori students in social studies to be particularly supported by immersion programmes, but not bilingual programmes to the same extent. We take up issues of Māori language further in Chapter 4 in the light of available research. Hohepa’s (1997) research, however, points out that there is a serious dearth of Māori language resources to support Māori language programmes, and the few that are available are likely to be used and reused throughout a student’s schooling. In the light of such research, and the findings across this review for Māori and Pacific girls and boys, issues of language, ethnicity and culture are central to identity, well-being and achievement, and should receive further substantial consideration. Elley’s (1992) finding that the disparity between the achievement of students for whom English is a second language and other students in New Zealand was greater than for any other country in the international literacy study signals how serious the issue of language and culture is in New Zealand. There is virtually no New Zealand research to review that focuses on gender and the intersections with other languages. Our omission of such research has been influenced accordingly, but the omission itself is a major equity issue. This chapter focuses only on English literacy as linked to the Curriculum statement.

The focus of this chapter is the New Zealand research and commentary, but we have signalled the wealth of emerging Australian research, in particular, that is available in this field. The major questions of the chapter address the concerns about boys’ performance and the links to gender, and the ways in which the cultural practices of literacy in schooling inscribe masculinity and femininity, and are negotiated by boys and girls. Luke (1993), in the text “Literacy Learning and Teaching”, argues that literacy is socially constructed and that:

’social class, ethnic and gender stratification of achievement in reading, writing and affiliated school subjects is at least in part produced by inequitable and inappropriate teaching, texts and assessment.’ (p.6)

However, it is evident in the literature reviewed that there are two contrasting approaches to literacy: one that, like the curriculum statement, implicates literacy as integral to culture and identity, and one that is almost entirely silent about issues of culture and identity in literacy. Given the salience of gender in the assessment patterns that follow, serious questions arise about the latter approach.

6.2 NEW ZEALAND STUDENT ACHIEVEMENT IN ENGLISH LITERACY: INTERNATIONAL COMPARISONS

New Zealand’s overall performance in literacy compared with international means is far higher than comparative performance in either science or mathematics.

In the comparisons for 27 countries carried out in 1990/1991 by the International Association for the Evaluation of Educational Achievement, the mean score for New Zealand ten year old students was sixth highest. Girls achieved at a higher level in their overall literacy scores in all countries — a pattern which Elley (1992) reported as consistent in the literature from the early 1960s. New Zealand showed the second largest gender difference internationally for the nine and ten year old students, with girls achieving a mean score of 539 and boys achieving a mean score of 519. The mean score for New Zealand boys’ was above the overall international mean of 500, but significantly and markedly lower than that of the girls.

The mean score for New Zealand 14 year old students was fourth highest in the IEA study. However, the gender difference for New Zealand students at this level was not significant, and 17 countries had a larger gender gap at this level than occurred for New Zealand students. The performance of both girls
and boys was well above the international mean in literacy, and higher than would be predicted from comparative educational expenditure. New Zealand’s relative position in student reading literacy internationally had dropped from its leading position for 14 year old students in the 1970 IEA comparison, but their performance was highest for English speaking countries in 1992.

**SUMMARY OF ENGLISH LITERACY: INTERNATIONAL COMPARISONS**

New Zealand students achieved sixth highest position internationally, and above the international means in literacy at aged ten. New Zealand students achieved above the international mean at age fourteen, to improve New Zealand’s relative position as fourth highest at this level. New Zealand’s overall performance in literacy, compared with international means, is far higher than comparative performance in either science or mathematics.

New Zealand showed the second largest gender difference nationally at aged ten, with girls performing more highly. Boys still performed way over the international mean at age ten. This gender difference was not evident in the findings for older students. There was no significant gender difference in the New Zealand data at age fourteen.

6.3 **MEAN DIFFERENCES IN ENGLISH LITERACY ACHIEVEMENT IN NEW ZEALAND BY GENDER, SOCIAL CLASS AND ETHNICITY**

As for science, gender differences in literacy means were substantially smaller than those for social class comparisons. Gilmore (1999) found gender differences in concepts about print on the first national survey of the results from the school entry assessments. Mean differences for school decile level, and Māori and Pacific students were greater than those between girls and boys.

Nicholson and Gallienne (1995) found that the reading achievement scores of 91 percent of 923 Year 9 students from mostly working class backgrounds were below the national average achievement level, while the reading achievement scores of 56 percent of 528 students from mostly middle class backgrounds were above the national average. Nicholson and Gallienne (1995) appeared to find no significant effect for gender amongst the 1451 students in their sample from eight secondary schools. However, language of home, father’s occupation, mother’s occupation and school location showed strongly significant relationships with these students’ achievement. Nicholson and Gallinne (1995) reported that school location contributed an additional 6 percent of the variance in scores after controlling for other variables. Accordingly, they concluded that equity considerations in literacy should include a focus on the links between reading literacy achievement and social class as well as the social class mix within schools.

Flockton and Crooks (1996) found differences on National Education Monitoring Project tasks by school decile level to be significant for 71 percent of the tasks at the Year 4 level, while gender differences were apparent for 50 percent of these tasks. Disparities in findings for school decile levels were apparent for 75 percent of the speaking tasks at the Year 4 level, while gender differences were apparent for 36 percent of the speaking tasks. At the Year 8 level, gender disparities were evident for 64 percent of the reading tasks, while school decile level disparities were evident for 93 percent of the tasks. What is evident in the NEMP results is that while disparities by decile level are substantially larger, disparities for both gender and SES (as measured by school decile ratings) across a national sample of students are substantial.

At the Year 5 level in the IEA study, differences by ethnicity were substantially greater than differences by gender for the items relating to documents, narrative and expository text with marked differences evident (Wagemaker, 1993). The difference between Pakeha students’ mean performance and Pacific students’ mean performance was three to six times greater than the differences by gender. The difference between Pakeha students’ mean performance and Māori students’ mean performance on these items was in the order of two to three times higher than the gender differences, with the
greatest difference again occurring for documents. On the word recognition task at Year 5 however, boys did significantly more poorly than girls, and this gender difference in means (3.94) was greater than any difference in means by ethnicity (2.18 Māori/Pakeha; 2.97 Pakeha/Pacific).

At the Year 10 level in the IEA results, mean differences by ethnicity were marked, while significant gender differences were non-existent, except for narrative items. The mean difference between Māori and Pakeha students on narrative items was twice the magnitude of that between boys and girls, and the mean difference on narrative items between Pakeha and Pacific students was over three times the magnitude of the gender difference. The larger mean differences for Pacific students signal a critical literacy issue for some Pacific students and students from a range of other ethnic origins for whom English is not their first language. Nicholson and Gallienne (1995) found that within six low SES schools, Pakeha and Māori pupils had significantly higher reading achievement scores at the Year 9 level than Pacific and Asian students in these schools.

Elley (1992) pointed out that the home language achievement gap for New Zealand students at Years 5 and 10 was higher than that for any of the other 31 participating countries in the IEA study. New Zealand’s students classified as non-English speaking scored 70 points below mainstream English speaking students at the Year 5 level, and 81 points below at the Year 10 level.

Nash and Harker (1997) analysed school certificate attainment means by social class and gender. These revealed the differences in mean scores in English between students from professional families and those from unemployed, unskilled or semi-skilled families to be almost three times the magnitude of gender differences within social class bands.

**SUMMARY — ENGLISH LITERACY ACHIEVEMENT IN NEW ZEALAND BY GENDER, SOCIAL CLASS AND ETHNICITY**

Gender differences in reading literacy performance have consistently been found to be less than differences in performance by ethnicity or school decile level.

School location has been found to contribute over and above the contribution made by other social class variables.

**6.4 GENDER DIFFERENCES IN LITERACY ACHIEVEMENT AND ATTITUDES IN THE COMPULSORY SECTOR: PRIMARY AND INTERMEDIATE LEVELS**

Early Childhood teachers’ perceptions of the communicative competence of 307 children in the ‘Competent Children at 5’ study were that 44 percent of girls were always confident in their conversations with adults, but only 29 percent of boys were always confident (Wylie, Thompson, & Kerslake Hendricks, 1996). These teachers judged 42 percent of girls as able to vary speech depending on situations, while only 28 percent of boys were judged to have this competency. However, it is difficult to assess the extent to which this research reveals gendered differences in the children’s competencies and/or gendered patterns in teachers’ assessments of children’s competencies. Newton (1992) and Fergusson, Lloyd and Horwood (1991), whose research will be explored later within this section of the review, found marked and significant discrepancies by gender between independent measures of literacy, and verbal participation and teacher assessments.

Given other evidence on gender differences in literacy at the primary level, an important finding of the ‘Competent Children at 5’ study was that the researchers found no gender differences in reading scores of new entrants to school (Wylie, Thompson, & Kerslake Hendricks, 1996). The assessment procedure used included four of Marie Clay’s early literacy diagnostic tasks. These tasks were administered independently by the research team. Wylie, Thompson, and Kerslake Hendricks (1996) stated:
'the lack of gender difference for reading performance just before entering school is not consistent with most of the New Zealand studies of the reading achievement of children between the ages of 6 and 13 years' (Slyfield, 1993, p.6). This raises questions about whether boys’ initial school experience differs from girls’, or whether there were existing differences in reading techniques or approaches to reading which our measures did not assess.’ (p.22)

Wylie, Thompson, and Kerslake Hendricks (1996) did find a large gender difference in whether or not children could write their own names. Only 9 percent of the girls scored nil or 1 out of a total score of 8 on this measure, while a quarter of the boys in the sample scored at this low level. The researchers found that 12 percent of girls had received direct parental instruction on writing activities, but less than half this percentage (5%) of boys had received such parental instruction. Girls were reported to be more likely to pretend to write or write in their own idiosyncratic script (12%) than boys (5%). However, five year old boys were reported to have a sharper perception of letters in signs and brands outside their homes (Wylie, Thompson, & Kerslake Hendricks, 1996). Wylie and Thompson (1998) found that at age six, girls were more likely than boys to copy printed material, copy school work and write stories or poems at home (78% of girls compared with 56% of boys). However, there were no gender differences in name writing, asking about specific letters, writing lists, writing on the computer or writing associated with a television, video or computer programme.

For the ‘Competent children at 6’ study, no independent measures of student literacy were used. However, teachers reported significant differences by gender in word recognition (girls’ mean of 21.0 compared with boys’ mean of 16.4).

Girls performed significantly better than boys on half of the National Education Monitoring Project reading tasks at Year 4, and 64 percent of reading tasks at Year 8. A brief comparison of the NEMP findings, with historical data from Progressive Achievement Tests conducted in 1968, shows that the gender difference revealing primary boys’ poorer average performance in reading has been long standing. For both PAT Reading Comprehension and Reading Vocabulary scores reported in 1968 and 1990, 93 percent of reading comprehension scores across Forms A and B showed gender differences in favour of girls from Year 4 to Year 10. As with the IEA results, there was evident a pattern of relatively consistent diminishment of the size of the disparity as the students got older. This pattern was evident also for reading vocabulary in 1968, where 86 percent of scores across Forms A and B showed gender differences in favour of girls from Year 4 to Year 10. Again, the gender differences were highest for the Year 5 level. In 1990, 93 percent of reading vocabulary scores across Forms A and B showed gender difference in favour of girls from S2 to Form 4. Again, the gender differences were highest at Year 4, but there was more variability on reading vocabulary evident from year to year.

In the 1991 IEA study, Standard 3 (Year 5) girls had significantly higher mean scores than boys on each of the domains (word recognition, narrative, expository, documents). Of particular concern are the gender differences evident in the latest NEMP findings for information skills, where all significant differences showed girls performed better than boys There were six significant differences for gender on the 20 tasks used at the Year 4 level, and seven significant differences on the 26 tasks used at the Year 8 level. These differences reflect boys’ poorer skills in the area of accessing written information. This finding is of deep concern because student ability to access information is critical across the curriculum.

Girls’ more positive attitudes to literacy, evident in the New Zealand research, has been a pattern evident in US research (Fitzgibbons, 1997; Pajares & Valiante, 1996; Tanner & Decotis, 1995). Interestingly, in the Pajares and Valiante (1996) study of 218 fifth grade students, males’ and females’ performance in writing was comparable, but girls reported higher writing self-efficacy, found writing
more useful and had lower apprehension. Pajares and Johnson (1995), in a study of 181 older (ninth grade) students found that, while these girls and boys did not differ on either aptitude or performance, the older girls expressed less confidence in their writing. Hispanic students in the sample had lower levels of performance, confidence, self-efficacy, and higher apprehension.

Gender differences in students’ attitudes towards language have not been confined to English language. Zammit (1993), in a survey of 32,000 Australian and New Zealand students participating in the Australian Languages Certificates, found marked differences by home language and gender. The languages included were: Chinese, French, German, Indonesian, Italian, Japanese, and Modern Greek. Zammit (1993) found that overall, males had less positive attitudes to learning languages than females.

This finding was consistent with a gendered pattern found in an earlier study by Zammit (1992). There was also more variability evident in the attitudes of males, who were markedly more likely also to discontinue their studies. There was a significant relation found between attitude and achievement. Exposure to another language at home resulted in better attitudes and better retention rates than for students who only spoke English at home, even when the language of home was different.

**SUMMARY — GENDER DIFFERENCES IN LITERACY ACHIEVEMENT AND ATTITUDES IN THE COMPULSORY SECTOR: PRIMARY AND INTERMEDIATE LEVELS**

Early childhood teachers assessed five year old girls as more confident and competent than five year old boys. However, researchers found no gender differences in reading scores of new entrants by gender. Teacher assessments have been found to incorporate gender bias. However, these research findings raise questions about gender differences at school entry. Girls had received more parental instruction before school, and boys were more aware of brand names. Teachers of six year olds found girls to be performing more highly in reading than boys, but no independent assessments were available.

The PAT and NEMP assessments show consistent gender differences favouring girls. These differences have been evident since 1968 in PAT scores. The size of the disparity decreased as the students got older. Of particular concern is boys' poorer performance on information skills.

Girls’ more positive attitudes to literacy are evident in both the New Zealand and international literature, but one US study revealed girls nearing school leaving age were less confident than boys. Girls are in general more positive also to learning a second language, and less likely to discontinue.

### 6.5 GENDERED PATTERNS OF PARTICIPATION IN LITERACY

There are two areas where gendered patterns of participation are particularly evident in reading literacy and English proficiency in New Zealand schooling: participation in reading recovery in the junior school, and subject choice and associated participation in examinations in the senior secondary school.

Rutledge (1997) compared a gender analysis from the initial field trial in reading recovery in 1978, which showed that 61 percent of the assisted students in the trial were boys. Recent data showed that 66 percent of the assisted students were boys. Almost two thirds of the places in reading recovery support boys’ reading. Rutledge (1997) focused on an argument considering the unintended ill-effects of reading recovery placement made by Elley in a paper he presented to the 1993 NZARE conference. Elley pointed out that pupils (who are predominantly boys) identified for special tutoring in New Zealand realise that they are failing in reading, and not meeting parents’ and teachers’ expectations, a year before children in most other countries receive their first reading lessons. Elley suggests that boys identified as needing reading recovery may suffer a blow to their self-esteem that is irrecoverable. In
an early evaluation of reading recovery, Glynn, Crooks, Bethune, Ballard and Smith (1989) were concerned about target children’s lack of progress after the discontinuation of reading recovery.

As the school leaving age has risen, English has become a less popular subject choice for school certificate over the 1986 to 1995 period, with English enrolments dropping almost 20 percent for boys and only slightly less for girls. Praat (1999) found that approximately 8 percent more girls than boys took the English examination in school certificate. However, the disparity reduced slightly in the most recent figures for 1997. Over the same period, about 10 percent more girls than boys participated in sixth form certificate examinations, and here the gender disparity increased to 11.7 percent in the most recent figures for 1997. Between 1990 and 1997, there has been about a 15 percent drop in percentage of girls and boys participating in English Bursary examinations. These apparent drops may be confounded by the later school leaving age. However, English is still the most popular subject choice for girls at Bursary level, and the second most popular choice for boys. Whereas in 1990, 61.9 percent of boys at this level took Bursary English, by 1997 less than half (45.5%) of boys took Bursary English examinations. Well over half of all girls in Year 13 take Bursary English, although their participation over the same period has dropped from 78.5 percent to 63.7 percent (Praat, 1999).

**SUMMARY — GENDERED PATTERNS OF PARTICIPATION IN LITERACY**

Boys are about two thirds of the recipients of reading recovery. There have been shown to be concerns about boys’ self-esteem in being identified as early failures in literacy. Students who discontinued reading recovery have been found to make very slow progress after the programme.

Smaller proportions of both boys and girls have been taking English in the senior secondary school as students stay on at school longer. Girls have been more likely to do English and to take English examinations at Bursary level, where it is girls’ most popular choice. English is boys, second most popular choice at Bursary level.

**6.6 GENDER DIFFERENCES IN LITERACY ACHIEVEMENT AND ATTITUDES IN THE COMPULSORY SECTOR: SECONDARY**

An analysis of Year 9 student performance on PAT reading comprehension, reading vocabulary and listening comprehension by gender was carried out in the Smithfield Project (Waslander, Hughes, Lauder, McGlinn, Newton, Thrupp & Dupuis (1994)). The researchers compared their findings with the standardised scores given by gender in the PAT manuals. On the PAT Reading Vocabulary test at the 0.05 level, they found that there was a significant difference by gender, in favour of girls. The Smithfield gender gap was, however, markedly less than that given in the PAT manual, because for their sample, girls had a lower mean score and boys had a higher mean score. There was no significant difference in their data for listening comprehension. The strongest significant difference occurred for girls’ higher mean score for reading comprehension. However, whereas in the Smithfield data the girls’ mean reading comprehension score was almost identical to that given in the PAT manual, the score for boys was again higher, indicating a lesser gender gap.

The Smithfield researchers wished to carry out tests of verbal ability that were ‘as free as possible from the influences of school curricula’ (p.33). Accordingly, they carried out additional tests of verbal analogies and used TOSCA. No significant gender differences were found on these tests. Waslander, Hughes, Lauder, McGlinn, Newton, Thrupp and Dupuis, 1994) concluded:

‘Not only do these results indicate that aptitude and achievement tests are different, they also raise questions about gender inclusiveness of the school curriculum.’ (p.43)

These results, together with the ‘Competent Children at 5’ project finding that there were no significant differences between boys and girls on reading literacy at school entry, raise significant
questions about gender and schooling. These findings lend weight to the conclusion reached by reviewers in the area of gender and science: that the gendered nature of curriculum and schooling at primary level play a significant role in gender stratification.

The significant gender differences evident in the 1991 IEA reading literacy study at Year 5 level were not evident in the overall Year 10 results. Girls outperformed boys at Form 4 (year 10) on all tasks except documents, but the only significant difference was in the narrative domain. Pacific boys outperformed their female counterparts on 2 of the 3 domains at the Year 10 level in the IEA results.

However, stronger gender differences in literacy at secondary level have been evident in national examination results and research studies. Praat (1999) found that girls were doing better than boys in getting A, B and C grades in school certificate English from 1992 to 1997. These findings of a gender disparity in favour of girls were largely consistent across ethnic groups for Pakeha, Māori and Pacific students. For English at sixth form certificate level for Pakeha, Māori, and Pacific girls over the same period, girls on average achieved more grade 4s or higher. This pattern has been evident also in Bursary results from 1990 to 1997, where girls have been achieving more B grades or higher in Bursary than boys, but at this level the gender disparity has been decreasing. At Bursary level also the gender gap in favour of girls has been recurrent across ethnic groups, with Māori girls doing much better than Māori boys and Pacific girls doing better than Pacific boys.

Nash and Harker’s (1997) study revealed the overall gender differences in English to be consistently the largest for three subjects – science, mathematics and English. These differences were consistently in favour of girls. The exception to this finding was marked gender difference in school certificate attainment of students from professional class families, favouring boys for mathematics, and girls in science. In an analysis of student performance in school certificate in 1996 by gender, Roberts (1998) pointed out that:

‘the fact that 33.5 percent of girls relative to 27.5 percent of boys receive an A or B grade in all papers is clearly distorted by the huge difference in English performance skewing the figures for ‘all papers’. ’ (p.9)

Praat (1999) concluded that:

‘differences in achievement favouring females have been a constant feature of the achievement data (in English) of recent years. Clearly males’ achievement in areas related to language and literacy in all levels of their school career is of concern.’

(p.39)

The pattern of girls’ higher mean performance in English literacy in New Zealand is not new. Rutledge (1997) pointed out that the pattern of gender disparity in reading literacy for New Zealand students has occurred for at least 30 years. Through personal correspondence with Professor Wolf, Rutledge found that gender differences favouring girls at the Year 13 level had been evident in literature interpretation and reading comprehension in the 1970 IEA studies, although gender analyses were limited in the reports at that time. McGeorge (1987) re-analysed a range of historical data sources and found Hogben’s statement in 1912 that girls progressed more quickly through the ‘primers’ to be supported by Inspectors’ reports from 1881 to 1916. McGeorge also identified subject specific gender differences in achievement in the 1914 University’s Matriculation Examination. Although in overall achievement there were no significant differences for senior school students by gender, girls did significantly better than boys in English in 1914.

Rutledge (1997) reviewed the partial evidence available about gender differences in adult literacy, and suggested that the gender imbalance evident in reading recovery participation ($1/3$ to $2/3$s) is likely to be reflected also in the prevalence of adult male illiteracy in New Zealand.
Qualitative New Zealand research on fifth form boys' participation in English has been carried out by Stephens (1996). She found English to be particularly aversive to New Zealand secondary school boys. Stephens (1996) concluded that 'for these fifth form boys, becoming a man also means demonstrating that one is not being a woman ' (p.192). For these New Zealand high school boys, to do English was to engage with the feminine:

*Jeff:* *Arts, English, music and languages are not a priority. Science and maths are top priority. And rugby! Rugby! Rugby!*

When asked about English, fifth former Michael replied 'Can we change the subject please?' and Nathan was similarly emphatic: ‘I dread English' (p.198).

Craig explained his issues with English in more detail as Stephens (1996) explained:

*Craig felt that English was a bad name for the subject as 'it was more to do with literature rather than language'. He felt that he had a 'bad imagination' and 'hates to make things up' such as when required to write stories'. * (p.198)

This pattern of boys rejection of English as not a masculine domain is taken up further in a consideration of 'Boys' within this literacy chapter.

Mickelson (1989) focused on literacy in asking the question of US society:

*In this society, in which educational credentials are linked to jobs, promotions, wages, and status, women’s educational accomplishments appear anomalous because women appear to receive far fewer rewards for their credentials than do men with comparable credentials. In view of the limited rewards that women are likely to receive for education, why do they do as well and attain as much education as they do?* (p.47)

Mickelson (1989) examined the empirical evidence in relation to four hypotheses about the reasons for these patterns. The first hypothesis suggests women see males and females as different reference groups and compare their performance and rewards only to those of other women. The second hypothesis Mickelson (1989) explores is the ‘Pollyanna hypothesis’. Young women think that the barriers their mothers faced will not be a problem for them. Given recent trends in the New Zealand labour market context, there is some basis for some young women holding this belief. The third hypothesis Mickelson (1989) explores is the social powerlessness hypothesis, whereby females understand their relatively powerless position to males, and set about to gain economic security by winning a husband — the role of education is to help in the central task of appropriating financial security through gaining a husband. Mickelson (1989) found that while the hypothesis might explain some of the gendered patterns for middle class white American women, working class and black women choose marriage for different reasons. In particular, black American women have a history of gaining employment (in a sex- and race-segregated occupational structure) more readily than black American men. Working class women see marriage as an economic necessity — not an option. The fourth hypothesis Mickelson (1989) investigated was the sex-role socialisation hypothesis that female sex roles demand that females be good and achieve well at school. Mickelson (1989) points out that in this theory, the association of school work (literacy related) with the feminine is a problem for boys:

*... the male sex role, especially among working class white boys, requires a degree of resistance to authority figures like teachers and a certain devaluation of schoolwork because it is 'feminine'.* (p.58)
Mickelson (1989) concludes that a consideration of the evidence from previous research provides some support to this hypothesis. However, none of the hypotheses she contends adequately explain the anomaly:

'A final shortcoming of all the hypotheses discussed in this article is the uneven ability of the theories to explain the achievement and attainment behaviour of women from diverse racial and class backgrounds.' (p.59)

Mickelson’s (1989) research at the outset of the decade emphasises the pattern that is clearly evident in the New Zealand data across the curriculum. Intersections of gender, class, ethnicity (and sexuality) are critical in understanding the ways in which gendered patterns are culturally situated.

### SUMMARY OF GENDER DIFFERENCES IN LITERACY ACHIEVEMENT AND ATTITUDES IN SECONDARY

The Smithfield findings suggest gender differences may have been diminishing over time, given lesser differences between their sampled the gender differences in the PAT manuals. The Smithfield findings also showed a gender effect on PATS that did not occur on verbal ability or TOSCA tests. They concluded gendered stratification in literacy may be influenced by curriculum.

In an uncharacteristic finding, Pacific boys outperformed Pacific girls on two domains within the IEA assessments at Year 10 level.

While there were no significant gender differences overall on the IEA literacy tests at Year 10, girls have been performing more strongly on national assessments and examinations. This pattern has been true at 6th form and 7th form levels, although the gender disparity decreased at this level. National assessments show gender differences persist across ethnicities, with girls performing better than boys for each ethnic group.

Gender differences in literacy performance are in general higher than in any other curricular area; the literacy statistics tend to distort findings when included in across-subject analyses of overall performance for girls and boys.

The pattern of girls' higher achievement in literacy has been evident in studies for more than a century in New Zealand data.

Mickelson (1989) asked why girls read and write so well, when the labour force returns are less than for boys. She considered arguments that females reference themselves to males or alternatively, they aim to appropriate husbands rather than high paying jobs. She explores evidence relevant to the Pollyanna hypothesis, where young women believe that social conditions will be fairer for them than their mothers. Finally, she considers the sex-role socialisation theory that sex roles demand of girls that they be good, at the same time, literacy is seen as feminine by boys and resisted. She found shortcomings in all these theories that did not adequately explain differences by gender, race and social class.

NEMP and IEA findings show boys' attitudes to reading to be significantly less positive than those of girls’ and the types of books boys and girls like to read to be different. Girls preferred romance and poetry while boys preferred science fiction, science and technology, sport and adventure. Māori students were least likely to have read books but most likely to have read newspapers. Pacific students were more likely to have read books overall than boys.

New Zealand secondary school girls' attitudes to reading have been found to be more positive, and they have been found to be more likely to own books, belong to a library and receive book tokens, than New Zealand boys. Boys prefer biographies, sport, the outdoors, and books about vehicles. These kinds of gendered preferences have been evident in overseas literature; however, research has shown preference to be unrelated (directly) to performance.

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Summary of Gender Differences in Literacy Achievement and Attitudes in Secondary (continued)

Māori and Pacific students have been found to be more dependent upon school for their reading material. The Duff type interventions have found ownership of books to increase Māori students’ performance in literacy.

Strategies suggested to address literacy issues in much New Zealand research have not appeared directly to address gender issues. Emphasis has been given to provisions for student access to books and silent reading. There appears to have been a shift in novel selection by secondary English teachers. Although over 70 percent of the authors of selected books were male, women tend to be portrayed in more positive roles in books selected more recently.

6.7 LITERACY TEXTS AND STUDENT ACCESS

The NEMP findings on the reading survey revealed New Zealand boys’ attitudes to reading to be statistically significantly more negative for enjoyment of reading. Boys also reported reading statistically significantly fewer books than girls (Flockton & Crooks, 1996).

Wagemaker’s (1993) analysis of the IEA results by gender and ethnicity at the Year 5 level showed that boys were the group second least likely to have read a book during the past week. Girls were most likely to have read a book. His analysis revealed that Māori students were least likely to have read books in the past week. Māori students were, however, most likely after Asian and other non—Pakeha students (apart from Pacific students) to have read newspapers. Pacific students were more likely to have read a book than boys overall. Wagemaker’s (1993) analyses revealed also the gender-specific differences in leisure reading of New Zealand students at the Year 10 level. Boys preferred books about science fiction, science and technology, sport and adventure. Girls preferred romance novels and poetry.

In an New Zealand study of 2202 fourth and sixth formers, Bardsley (1991) found significant and sustained gender differences in reading habits, attitudes and interests. Girls, at both fourth form and sixth form level, read more, enjoyed reading more, bought more books, were more likely to belong to a public library, were given more books and were given more book tokens than boys. Fathers were much less likely than mothers to discuss reading with their children across all ethnic groups. Pacific parents were least likely to discuss reading with their children than any other ethnic group. There is an intersection with social class evident in these findings, showing that middle class and professional parents most often discuss books with their children. European students were found to be the group who most often discussed what their parents read. Interestingly, Bardsley found that the rate of reluctant readers amongst boys compared with girls increased in senior secondary schooling. Also, Bardsley found marked preferences in reading materials:

‘Science fiction, war, adventure and sport remain interesting to males — love and teenage to females. A similar pattern exists in non-fiction preferences — boys favouring biography, sport, the outdoors, and cars and trucks more than girls do.’

(p.97).

Māori and Pacific students ranked sport more highly and European students ranked ‘humour and classics’ (p.113) more highly than Māori and Pacific students did. Ackerley (1997) carried out a study of reading preferences of 236 Year 9 students in rural New Zealand, and found similar preferences towards the end of the decade of study. However romances featured less as a preference than in earlier studies, and girls showed a strong liking of horror books and mysteries. Boys preferred non-fiction, mostly sport. Low ability boys in particular disliked fiction. Campbell and Donahue (1997), in a study of a national sample of US children, found gender specific choice patterns (across ethnicities) to be less evident at grade 8, but very strong by grade 12:
Explain and Addressing Gender Differences

Among 12th graders males were drawn to a story about soldiers, and females were drawn to a story about a relationship. (p.1)

Campbell and Donahue (1997) found that although gendered patterns were evident in text choice, performance was not related to students being able to choose their own texts.

In the New Zealand study, Bardsley (1991) also found gendered patterns in impediments to reading. Girls were more likely to be unable to read because of their responsibilities in helping at home. Boys were more likely to be engaged in sport or in part-time work.

Bardsley (1991) found the higher involvement of girls in reading to be associated with higher achievement in school certificate English at the beginning of the decade of study.

There were strong patterns of ownership and access related to ethnicity and parental employment. Also, gender and ethnicity appeared to interact in the reading patterns. Girls of all ethnic groups gained higher marks in School Certificate English than did boys. Māori and Pacific boys were found to be particularly dependent upon school for their reading. Māori boys are particularly disproportionately more reluctant to read.

Among fourth form boys who were the children of unemployed parents, 15 percent had no access to reference books at home, 14 percent of Pacific boys had no reference books at home. 10 percent of Māori boys had none. Only 4 percent of other boys, including Pakeha, were in this category (Bardsley, 1991).

Bardsley (1991) concluded that ‘significant numbers of boys have either not developed, or have abandoned, the reading habit’ (p.123). Bardsley (1991) suggests: using book flood strategies, providing daily silent reading and reading spaces within the school; appointing a reading co-ordinator who is not a busy Head of Department; developing cumulative records of student reading information; liaising with parents; and establishing stronger networks and dissemination strategies amongst teachers. She does not specifically address the gender issue in the recommendations, but suggests a range of provisions to enable students to read.

Literacy texts have been argued by US researcher Evans (1996) to be deeply influential:

‘The issue of the text being read and its influence on subsequent discussions have important implications. Just as the texts and discussions of text may promote gender stereotypes and reproduce gendered forms of agency, they also can be potentially powerful tools for generating new meanings ... Such texts are likely to provide both females and males with opportunities to 'bump up against ideologies' and try on alternative forms of agency. Thus we need to select carefully what we offer as choices for reading materials if we want to provide our students with such opportunities.’ (p.194)

Burnett (1998) reviewed previous research, conducted by Lesley Taylor in 1980, to investigate the fiction texts being read by Year 9 to Year 11 students in a selection of New Zealand high schools. Taylor found that ‘approximately 71 percent of the authors of the 52 books were male... The books tended to portray males in a stronger physical and emotional light than the females’ (Burnett, p.3). Tapp (1989) in a survey of novels used at Bursary level found that 73 percent of the authors were male. Although Burnett (1998) found, in a study she carried out in 1997, that the proportion of women authors of novels used at Bursary level was still only 34 percent, she considered that there had been a shift in novel selection over the previous five years. Burnett described the shift as English Departments ‘making an effort to include books on their reading lists that portray women in stronger, more positive roles, many of which, though by no means all, are written by women’ p.4.
6.8 PEDAGOGY AND ENACTED CURRICULUM

Oracy

While girls generally achieve more highly in English literacy, boys predominate in public verbal behaviour or oracy in educational practice in New Zealand and internationally. There has been evidence in the New Zealand research that public participation in class discussion shows no relationship with student achievement. Hughes (1973) experimentally manipulated pupil participation and student reactions in class lessons. He found no relationship between student rate of overt public response and adjusted achievement, and concluded that students could process curriculum content as effectively with covert processing as overt participation, given an effective whole class lesson. A fuller discussion of the function of oral language, and links to the learning process, is provided in Chapter 10. Because of the nature of the English curriculum and its central concern with communication, there is considerable potential for further fruitful research, and theoretical work on this issue, within the Languages curriculum area.

Newton (1992) carried out observations of 47 girls, 45 boys and four teachers in a junior school over an eight week period, to explore the ways in which girls and boys participated in ‘morning talks’. She compared her observational data of actual student participation in class with teachers’ assessments of student contributions to discussions. Newton found that boys engaged in 69 percent of all public teacher-student interactions. As for the evidence in relation to science, the mean statistic for this New Zealand study is markedly higher than the international average (Kelly, 1988). In her meta-analysis of 81 studies, Kelly found that boys received 54.1 percent of all teacher-pupil interactions in reading.

In one class in Newton’s (1992) study, boys engaged in over 82 percent of all teacher/student interactions. Over the four classes, boys initiated 69 percent of all interactions with the teacher initiated by students. The teachers initiated 69 percent of their pupil interactions with boys. Newton found that boys were more likely to be successful in getting the teachers’ attention through calling out. Boys received more of both positive (59%) and negative (77%) teacher evaluative comments. Newton concluded that boys’ bad behaviour did not of itself account for the greater attention they received from teachers.

Newton also found that the teachers’ assessments of the students’ oral participation before she carried out her observations were mismatched with the actual patterns of participation she observed. In the class where girls engaged in less than 18 percent of teacher/student interactions, the teacher judged the girls to be more consistent contributors to class discussion (85% of girls) than the boys (72% of boys).

Newton’s findings about gendered patterns of oral participation in New Zealand junior classes are consistent with research on adult oral participation patterns in New Zealand (Holmes, 1997). In reviewing a variety of New Zealand studies in homes and workplaces, Holmes concluded that New Zealand men tended to dominate verbal interactions … (and) disrupt others’ contributions in order to make their own, while New Zealand women were more likely to be responsive listeners, minimising interruptions and providing positive feedback to others. Holmes concluded also that the research indicates that New Zealand men tend to overlook and de-emphasise affective meaning in their use of language. Holmes argued that although New Zealand men tend to dominate the discussion in formal meetings, and get more than their fair share of the interaction, they may be losing out on vital information through their language behaviour:

‘... dominating the talking time and successfully interrupting to gain the floor may seem very satisfactory to men who have never experienced good shared interaction. But a more equal distribution of turns in a discussion is much more satisfying and enjoyable for all participants, and much more productive in the long run.’ (p.62)
Stephens (1996), in her study of fifth form boys' participation in English in an all-boys school, saw patterns of verbal participation in an all boys setting as linking to broader regimes of masculinity and behaviour. She concluded:

‘That there were clear links between a boy's investment in hegemonic masculinity, his participation in the public verbal space of the classroom, his risk-taking behaviour (in and out of school) into social issues, and his development of anti-or pro-social behaviour.’ (p.211)

Stephens (1996) also found particular forms of hegemonic masculinity to be underpinning practices that are damaging to boys' health, and costly to the country at large. She reported 1992 ACC figures showing that sports-related injuries in rugby, league and soccer cost New Zealand over $37 million dollars.

Stephens (1996) also linked her findings about classroom participation of boys in a single-sex setting to ethnicity and social class:

‘In the single-sex school in which I carried out my study, the relations of class and ethnicity are also salient. The school structure, streaming practices, subject hierarchy, subject choice and even the pictures on the walls all promoted and upheld hegemonic versions of masculinity concomitant with white ethnicity and ruling class-based interests.' (p.211)

In a landmark research study of the cultural construction of language in Te Kohanga Reo, Hohepa, Hingaroa Smith, Tuhiai Smith and McNaughton (1992) revealed how language acquisition is culturally contextualised. Their analysis of student-teacher and student-student interaction revealed how whanaungatanga (identity as part of a family group) and Tuakana-teina (shifting roles of responsibility in relation to the reciprocal commitments of older and younger), awhina, (affection, concern) and Te Reo Mäori (Mäori language) were integral to the cultural construction of language. This analysis of the links between culture, language and pedagogy provides a rare insight into the ways in which sociocultural identity can be shaped within educational settings. The analysis may also provide an insight into the markedly different kinds of interaction patterns occurring in immersion programmes in Carkeek, Davies and Irwin's (1994) study in social studies. Such insights are critical, because the language environment in immersion programmes was clearly providing a more positive social environment for Mäori boys and Mäori girls than bilingual programmes, and a markedly more positive environment than mainstream settings( Carkeek, Davies & Irwin, 1994).

Given the overall low mean English literacy achievement of Pacific students in New Zealand, there is a clear need for classroom research about the experiences of both Pacific boys and girls. The uncharacteristic gender finding in the IEA study that Year 10 Pacific boys did better than Year 10 Pacific girls raises important questions about both ethnicity and gender in English literacy education for these students. Jones' (1991) research about the schooling of Year 10 and 11 Pacific girls constitutes one of the few studies of educational practice with Pacific students, and provides insight into the classroom experiences of secondary Pacific girls, leading up to the 1990/91 IEA study.

Jones (1991) initially drew upon Bourdieu’s explanation of schooling in cultural and political terms to explain different achievement and school outcomes for different groups: ‘what happens in the classroom must be understood as an expression of the interaction between the culture(s) of social classes, and the routines, values, style (the culture) of the school ‘ (p.93). Jones (1991) used Bourdieu’s notion of symbolic violence to characterise the processes by which ‘particular classes exert their power, not through physical coercion … but through attempting to impose their own cultural perspectives in everyday thought and practice. By making publicly available (particularly through
schooling) only those cultural forms which are their own, dominant groups exert symbolic violence on subordinate groups’ (p.93).

However, Jones characterised the process as a complex interaction between the cultural and social class-based beliefs and practices of groups of students, and those of their teachers. Unlike the findings of working class resistance in comparable ethnographic British research, Jones (1991) found the Pacific girls to have a ‘pro-school stance’. The ways in which the Pacific girls and their teachers unknowingly colluded in complex and patterned classroom interactions that were not conducive to these students’ learning were revealed through the ethnography.

Jones (1991) found the mismatch between the Pacific girls’ ‘wait-and-copy’ understandings about appropriate working behaviour in school and the cultural requirements for success in schooling, to be particularly marked in English. The 5 Mason girls’ understandings led them both to refrain from asking questions, and to discourage teachers from asking them questions demanding interpretation:

Linda: I don’t ask questions, even when I don’t know something.
AJ: Why not?
Linda: Well, she’s already taught it so I should know it. I should! She’ll think I’m rude and not listening and that (p.99).
Martha: Teacher asks me to ask questions. I never ask questions. I just keep quiet and I always say ‘What?’ when she asks me questions ...
(p.79)

From these girls’ perspective the appropriate strategy was ‘to learn the notes’ in order to be able to reproduce the curriculum content for examinations.

However, Jones (1991) pointed out that the cultural tools demanded by the school were not those these girls perceived to be necessary. The 5 Mason girls’ English teacher explained:

‘There’s no such thing as regurgitation in English — useless. ... It’s not enough for them to learn things off by heart. They need to be able to think on the spot [in the S.C. English exam], and order and select information in a judgmental way — make their own judgement.’ (p.107)

Jones argued that as students participate with teachers in classroom talk and written work, the practices of the subordinate and dominant groups are differentially rewarded:

‘Paradoxically, the teachers actively collaborate with these girls in this situation, by being sensitive to the Pacific girls’ ‘shyness’, and wishing to avoid any discomfort caused by asking these girls such questions.’ (p.118)

Jones contrasted the interactions between the teachers and the Pacific working class students with those between the teachers and middle class Pakeha girls in a high streamed class, 5 Simmonds. The 5 Simmonds girls’ ‘cultural knowledge’ about school was evident in their treatment of teachers as a resource paid to be available to help them succeed. Jones cited an example of Vivienne: Vivienne asked her teacher to help improve her essay writing and content-linking strategies to assist her to raise her marks in all subjects requiring essay writing.

Jones also observed the pedagogical power of the extended dialogue that occurred between teachers and middle class Pakeha girls that enabled the teachers constantly to diagnose the status of the girls’
understandings. Such dialogue also supported the development of metacognitive skills through the ‘thinking aloud’ characteristic of this talk.

‘Girls’ High’, the school in which Jones conducted her research, was proactive in taking up the findings of the research, and seeking ways to change these culturally-patterned practices in the classroom. For example, the school abandoned their policy of streaming, and integrated their diverse students into heterogeneous classes. Their strategy is well-supported by international research evidence. For example, in a review prepared for the Massachusetts Board of Education, French and Rothman (1990) concluded:

‘There is little evidence that ability-grouping or tracking (streaming) improves academic achievement, while overwhelming evidence exists that ability-grouping retards the academic progress of students in low- and middle-ability groupings’ (p.3)

Jones (1991) returned to the school and reflected that after the changes, the Pakeha and Pacific girls now knew each other as classmates:

‘the Pacific girls in particular were not so inhibited in interacting with their teachers — and the Pakeha girls did not seem so unself-consciously dominating in the classroom.’ (p.186)

However, after observing verbal interactions in English classrooms, Jones found that although the Pacific girls were participating frequently, there were still marked differences in the nature of talk happening, and its usefulness for school learning:

‘The Pacific girls tended to engage in active, but non-substantive verbal interactions with one another and their teacher, collectively reinforcing and repeating one another’s responses; while the Pakeha students tended to engage in more distanced information gathering which, it appeared, could be directly and usefully applied in an examination.’ (p.187)

## SUMMARY OF ORACY IN ENACTED CURRICULUM

Boys tend to predominate in public discussion in English classrooms in New Zealand and elsewhere. These patterns have been found to be most marked at the junior school level, but reflect research findings of male dominance of oral participation in homes and workplaces.

The mismatch between school discussion/literacy practices and the oracy/literacy practices of Pacific students has been likened to a process of symbolic violence, described by Bourdieu to characterise schooling relations between dominant groups and minority groups across educational systems.

Jones (1991) research found that Pacific girls’ ‘wait-and-copy’ approach, and reluctance to ask questions, were in conflict with the requirements of school certificate examinations. Pakeha students, by contrast, were treated differently by teachers in class, and used their cultural knowledge of the school to succeed. When the school abandoned streaming and integrated students across heterogeneous classes, the dominance patterns changed to support more equitably heterogeneous patterns of interaction. However, Jones(1991) found that there were still marked differences in the nature of talk happening and its usefulness for school learning.

## 6.9 ENGLISH LITERACY: WRITING AND STORIES IN ENACTED CURRICULUM

Marsh (1998) studied the stories of six year old British girls and boys of different ethnicities and social class backgrounds, which they wrote for boys and girls. She found clear evidence of ‘gender skewing’ in the children’s writing and concluded:
'Despite many years of feminist research and campaigning, society still perpetuates gender divisions which are based on stereotypes. Schools are part of this process. Mac an Ghaill is sure that 'schools do not merely reflect the dominant sexual ideology of the wider society, but actively produce gender and heterosexual divisions', Schools should work to ensure this is not the case, and provide children with opportunities to deconstruct their highly gendered worlds.' (p.17)

White (1990) found marked gendered patterns in the writing of young Australian children and commented:

'There is nothing new in the suggestion that language is a form of social control, but there is a poignant irony in the fact that, when children are encouraged to draw on their own resources as language learners, they may come to identify still more closely from the controlling systems from which we seek to free them. Gender identity is constantly rehearsed and reproduced in language.' (p.165)

Few studies involving classroom observations of boys’ engagement with literacy curriculum have been carried out over the past decade, or indeed, previously. Perhaps because of the lack of such research evidence, anecdotal material has been published to address the need. For example, McLennan (1998) published her personal observations, self-described as ‘unscientific and generalised’ (p.17) entitled ‘… the adolescent male English student is a unique species …’ McLennan identified the differences from a teacher’s perspective as she adjusted to the energy, exuberance and the ‘writhing, restless, noisy … inattentive … abusive, quasi-violent camaraderie (p.17)’ of boys after her experiences of the ‘orderly circles of … clutches of girls sharing quiet confidences’.

Bird (1992) contrasted the positions of authority taken by girls within the literacy programme in a New Zealand primary school with boys’ authority in the playground, which she observed to be based primarily on physical force. Bird (1992) noted how one teacher positioned girls as the teachers’ representatives, and brought girls’ expertise to the fore in public displays of expertise. Older girls were paired with younger boys to help with their reading. Bird (1992) saw these positionings as reflecting mother/child relationships, and observed that older boys did not appear to be taking a role as peer tutors for younger girls. Boys helped younger boys. Bird observed several incidents of hostility from older males during reading. The prevalence of aggression in schools which Bird observed led her to report the incidents she witnessed involving girls, and those she witnessed involving boys, as initiators of aggressive behaviour:

'My fieldnotes revealed eight incidents of aggression involving a girl pushing a boy or grabbing an object from a boy. There were also three incidents (all associated with only one Standard One girl) of a more violent nature (punching or hitting), and two incidents where both boy and girl appeared evenly matched in terms of physical blows. I also observed fourteen incidents of physical aggression from a variety of boys directed at girl(s). These included episodes of boys poking a girl’s bottom with a finger or pencil; a group of several boys knocking a girl on roller skates to the ground; a different (younger) group of boys following a slightly older girl around the playground and pulling her off balance to the ground by tugging on her jumper; and a boy sitting heavily on the back of a girl who was lying on the floor.'

In reflecting upon incidents she observed in writing, Bird identified for the New Zealand context the power of an underlying code of heteronormativity in constraining boys’ behaviour in literacy — a girls’ subject. Bird provided two alternative readings of Sam’s disruptiveness around the writing table as he interrupted the girls’ activities, and attempted to grab their things. Like many other researchers,
Bird (1992) observed that the constraints on boys participating in “girls’” activities were maintained through implicit heteronormative codes. Using powerful and distinctively New Zealand imagery, she identified the constraints as:

‘barbed wire fence between the genders; of straying from one’s real gender to endanger one’s proper heterosexual orientation. To take an interest in girls’ things is to risk positioning oneself as a girl — to be in Butler’s terminology, boy-as-girl, which in western culture is synonymous with being a gay male, frequently a reviled social position.’ (p.167)

One of the most significant bodies of work in literacy has arisen out of Davies’ (1989; 1993) work on texts in classrooms and preschools. Davies (1993) used post-structuralist theory to deconstruct, with primary students, the gendered dimensions of the texts they read and the texts they wrote. Davies (1993) has critiqued sex role and socialisation theories for their inadequacy in explaining student agency:

‘These children were not being pressed into masculinity and femininity as sex role socialisation theory suggested. Rather, in learning to be coherent members of their own social worlds, they were actively taking up their assigned gender as their own in ways not necessarily compatible with the ways their teachers and parents were telling them gender should be done. In learning the discourses through which maleness and femaleness are spoken into existence, they learned to locate themselves within and through the category systems through which gender is constituted. They learned to make sense of the world and themselves through the bipolar categories of female and male, recognising the obligatory nature of being one and not the other, of being one that is also the opposite to the other. Any discourse about equity that adults might introduce to them could only affect the minor detail of this difference, and then only if that detail had not become a key signifier of masculinity and femininity.’ (p.xvii)

Davies (1993) contends that because words are tools, the nature of the tools themselves inscribes gender. Davies’ argument would help explain also why so many studies of gender in which teachers have directly addressed issues of sex-role stereotyping appear to have compounded gendered practices rather than challenged them. Davies (1993) describes in depth a series of dialogues between an adult and children about their texts, and the gendered dimensions of experience. Through such dialogue, she sees the possibility of respectfully engaging students with critical reflection on the ways in which they negotiate, are constrained by, or can expand the possibilities for their actions and lives.

However, Davies (1993) does not just see social change in literacy occurring through such different kinds of interactions with students:

‘But the struggle towards the new in gender relations is not just a struggle that can be left in the hands of children or of writers, nor one that can be resolved through different ways of interacting with children ... Structures need to be changed in both the children’s and our worlds. Political changes, equally radical to the changes in patterns of interaction described here between teachers and children need to take place. Patterns of exclusion on the basis of sex still need to be addressed. Sexual harassment and sexual assault need to be made absolutely unacceptable within the rules of culture and within the patterns of behaviour accepted in any one institution. Girls will continue to get caught up in patterns of desire and forms of femininity which are organised around the potential vulnerability of their bodies as long as sexual assault remains a mechanism for keeping them in their place. Boys
will continue to experience themselves as masculine through such patterns of harassment and assault as long as hegemonic discourses constitute masculinity in opposition to and superior to femininity.’(p.200)

Davies (1993) concludes that the male-female dualism, and all the associated binary metaphors through which it is generated, maintained and made solid ‘must be deconstructed, opened up towards the possibility of multiplicity’(p.200)

With shades of Ashton-Warner evident, Searle and Knobel (1998) make the point that the students who are most at risk frequently have the diversity of experience that a critical literacy approach can empower:

‘The issues of inner-city education will never be resolved while we look upon these remarkable and vibrant students as problems. Many students I have taught in English working-class area areas know and can negotiate in at least two languages and two cultures by the age of 12 or 13. Accordingly, they often come to school knowing already how to analyse a social or cultural practice into its component features and processes ... My critical literacy work with these students over the years has taught me that effective literacy learning is forged in the heat of analysing and addressing real problems in these students’ lives.’(p.86)

Lankshear (1998) suggests that educators need to create spaces for themselves to:

‘reflect critically on literacy and literacy education ... By reflecting on their own classroom literacy practices, and the questions generated by cases like Jacques (‘I’m like my dad, I’m not a pencil man’), teachers can begin to develop their own set of ’guidelines’ that will inform the criteria they use to ’judge’ and construct equitably or ’morally just’ literacy practices in their classrooms.’(p.125)

Lankshear (1998) describes the strategies a teacher went through in trying to make the genres and practices of literacy in the classroom relevant and connected to Jacques’ experiences. Jacques’ journey into a particular genre of literacy, through creating flyer for a lawn mowing business he was running, is described by Lankshear.

### SUMMARY OF ENGLISH LITERACY: WRITING AND STORIES IN ENACTED CURRICULUM

Research in literacy suggests that schools actively produce gender and heterosexual divisions.

Few New Zealand studies document boys’ engagement with literacy in enacted curriculum. Bird (1992) found both girls and boys to be engaged in violence at school, but many more boys were actively engaged in a wider range of, and more frequent, violent behaviour than girls. Bird(1992) contrasted girls’ positions of authority through representing the teacher in class with boys’ positions of authority through their use of aggression in the playground. Bird observed boys’ behaviour to be constrained by ‘the barbed wire fence between the genders' that deters boys from acting as a girl.

Davies (1993) has critiqued earlier theories of gender, arguing that sex-role and socialisation theories deny the agency of students. She uses post-structural theory to show how students situate themselves within and through the category systems through which gender is constituted. Davies argues for a process of respectful deconstruction in dialogue with teachers and girls and boys, that open up the possibilities for students. Davies (1993) suggests that such a process is critical to enabling boys to constitute themselves as masculine in ways that are not linked to harassment and assault.
6.10 ASSESSMENT

Fergusson, Lloyd and Horwood (1991) carried out a comparison over four years of teacher ratings of the performance of over 1000 8–11 year old students. These were in a Christchurch longitudinal sample, with student performance on WISC-R IQ tests, Burt word reading and progressive achievement tests. They found ‘consistent tendencies for teachers to evaluate the scholastic performance of girls more favourably than that of boys’ (p.160).

The authors found that their independent tests showed girls to perform significantly more highly than boys on literacy measures. Notably, 10 year old boys performed below their chronological age on reading comprehension, with a mean score of 9.5 years. while their female peers performed well above their chronological age level, with a mean of 11.3. The measures used were the Burt word recognition assessments at eight, nine, ten and eleven years, and the reading comprehension PATs at 10 years.

Fergusson, Lloyd and Horwood (1991) reported that teachers evaluated the scholastic performance of girls more highly than that of boys, over and above the actual gender differences they found. They reported that ‘the gender differences in teacher-rating appeared to be most marked for ratings of performance in reading and written expression’ (p.160). The authors concluded that teacher assessments may be influenced by ‘incidental factors relating to the child’s demeanour and behaviour in the classroom. Pupils who are diligent and well-behaved may be evaluated more favourably than pupils of equal ability and achievement who lack these attributes’ (p.162). They argue that teachers unfairly undervalue boys’ performances because of boys’ ‘more aggressive and generally disruptive behaviour ‘ (p.162). McDonald (1994), in critiquing Fergusson, Lloyd and Horwood (1991), suggested an alternative interpretation that ‘standardised tests are biased against girls and do not give them full credit for their academic performance in class’ (p.90).

Fergusson, Lloyd and Horwood’s (1991) findings suggest that boys’ disruptive behaviour may be confounding the academic assessments made of them, and confirm other research suggesting that teachers and testing play an active-if inadvertent-role in gender stratification in schooling. Their findings, and/or McDonald’s alternative interpretation, may also cast some light on the contrast between the generally negligible gender differences in reading literacy at the Year 10 level in the IEA study, and the more marked gender differences evident in boys’ poorer average performance on secondary school assessments.

SUMMARY OF ASSESSMENT

Teacher ratings of literacy performance are suggested to be gender-biased because of the differential behavioural patterns of girls and boys. Teachers have been found to rate the scholastic ability of girls more highly than boys, over and above the difference shown by independent measures of word recognition and PATs. Fergusson, Lloyd and Horwood (1991) perceived girls to be advantaged because teachers valued their diligence. Boys were unfairly penalised by teacher rating of literacy performance because of boys' aggressive and generally disruptive behaviour. McDonald (1994) argued an alternative position: that standardised tests are biased against girls and do not give them full credit for their academic performance in class.
6.11 BOYS AND LITERACY

The new national curriculum statement for English was published in 1994, subsequent to the 1990/91 IEA studies. This document made explicit acknowledgment of the research finding that ‘girls are more successful than boys in English at school … (and) boys … may be restricted because of lack of achievement in English’ (p.13). In a section entitled ‘The Gender-inclusive curriculum’, the document highlighted disadvantage that can occur for both boys and girls through language use and stated that ‘a gender-inclusive curriculum has a critical role to play in producing and maintaining equitable outcomes for all students’ (p.13).

In 1997, the Ministry of Education published a guide for teachers: ‘Planning and assessment in English’, that specified the need for varied texts to meet the needs of both girls and boys.

Meeting the needs of boys in literacy may be a formidable challenge when boys themselves see doing literacy as a threat to their masculinity — an activity that positions them as girl or queer. A recent publication, by an Australian, Swanderson (1999) in Reading Forum NZ, gives a vivid account of boys’ views about themselves as readers. The boys described a ‘wuss’ as a boy who ‘reads all the time, everywhere’. Synonyms for ‘wuss’ included:

‘loser, a dweeb, an idiot, a dork, a dick, a moron, posh, pussie, a douche, a girl, a girl lover, a wimp, a wanker, queer, gay, happy, gay farts, weird, a donkey brain and twinkle toes.’ (p.9)

This theme of the power of homophobia to constrain male positioning and its attendant influence on boys’ perceptions of reading as dangerously associating them with the feminine persists through the research at every class level. Australian research on middle-class boys’ attitudes to English by Martino (1997) has been featured in Gender Equity: A Framework for Australian Schools. Martino’s focus has been the effects of dominant models of masculinity on the learning of both boys and girls. Martino used a questionnaire with 156 Year 10 and 93 Year 11 students from a private co-educational school. He designed his research to explore the possible links between masculinity and poor performance, in the subject English. Martino found that there were marked ‘differences in the ways in which boys and girls perceived English, which related to their position as gendered subjects and which appeared to influence their performance along gender differentiated lines’ (p.126). The boys’ responses focused on activities they not only preferred to reading, but saw as oppositional to reading, such as sport and computer games. The study of English, Martino suggested, was not perceived to support or validate these boys’ masculinities. Boys saw English as a girls’ subject.

Martino (1995; 1997; 1998) identified the use of ‘othering’ labels by boys in schools (such as ‘dickhead’, ‘poof’, ‘try hard’ and ‘loser’) as evidence of the ways in which Australian boys act out abusive forms of masculinity. In Martino’s doctoral research, boys’ responses revealed that they felt threatened by the demand to express their emotions in English classes. Martino argued that the boys’ rejection of a subject that is perceived by them to be effeminate or girlish exemplifies the way in which masculinity is socially policed and regulated. Such regulation, Martino argued, is also powerfully enforced through hegemonic heterosexuality. For boys to talk openly about their feelings is to risk charges of effeminacy and homosexuality. If they fully engage with the emotional literacy emphasised within the subject English, boys are at risk of having their masculinity questioned. Martino (1995) called for a deconstruction of masculinity as a unitary or monolithic category. Martino (1997) concluded:

‘By focusing on the gender system in terms of the ways in which versions of masculinity and femininity are institutionalised through specific regimes of practice, what becomes possible is a mapping out of the limits and possibilities of...’
an alternative set of practices designed to improve the educational outcomes of both girls and boys.’ (p.137)

The New Zealand Association for the Teaching of English has been proactive in disseminating international, and in particular, Australian research on boys and literacy, including the research of Wayne Martino (1998) to the secondary profession. Martino suggests that teachers use critical literacy as a tool to enable students themselves to interrogate masculinities and homophobia.

Stephens’ (1996) study of fifth form boys does not provide assurance that such interrogation is evident. After observing English in action in the enacted curriculum, she concluded that ‘limited opportunities are afforded by the secondary school curriculum for the boys to develop critical self-reflective skills’ (p.1) Stephens (1996) also found that there were substantial difficulties encountered by boys ‘whose sense of self was in conflict with hegemonic masculinity’.

The constraints of hegemonic masculinity, heteronormative, and homophobic practice evident in Stephens’ (1996) study were reflected in a project reported by Coote (1998). Coote (1998), while a New Zealand trainee secondary English teacher, carried out research similar in focus to that by Martino with 40 Year 10 students from a co-educational state school in New Zealand. Because Coote used a decile 4 school, her participants were likely to have been more working class than Martino’s participants from a private middle class Australian school.

She asked the students to write about mainly male story characters in situations such as playing with dolls, fighting in response to being called faggot, reading rather than playing football, hugging and crying. Coote found homophobic responses to be particularly evident in boys’ responses to her scenarios. After analysing the students’ responses she suggested that masculinity is socially policed for boys, and to a lesser extent girls, in New Zealand. The boys in particular held firm views about appropriate masculine or ‘manly’ behaviour, and responded with derogatory and homophobic characterisations of any transgression of such behaviour.

Coote (1998) found that her New Zealand respondents had more positive attitudes to literacy than the Australian boys in Martino’s study. She attributed this finding to the quality of the study school’s English programme. Coote concluded that a predominant strategy used in New Zealand to address boys’ lesser engagement in reading, the use of texts oriented to boys’ interests, may be problematic. She suggested that more proliferation of traditionally sex-stereotyped books for boys may inadvertently enforce the policing of masculinity, and the characterisation of literacy as feminine, and inappropriate for boys. She, like Martino, argues instead for a critical literacy approach, in which students are engaged critically with the possibilities for less restrictive forms of masculinity.

Drawing on his experience in the English educational system, Howe (1999) suggests integrating reading and literacy activities with technology to attract boys and benefit girls. Howe (1999) described an action research approach which enabled English teachers to generate literacy activities designed to address boys’ issues with literacy in particular. For example, when these teachers found that boys were not networking over their reading in the same ways as girls, he suggested a structured activity to promote boys’ networking around their reading.

Australian gender equity initiatives are producing material specifically designed to meet the needs of boys in literacy. For example, Alloway and Gilbert’s (1998) Boys and Literacy’ includes 19 teaching units. These have been developed in Australian schools to focus on: the construction of masculinity and femininity through language practices; the relationship between language, gender and culture; gendered teaching and parenting practices as they impact on literacy learning; the value of critical approaches to literacy for boys as well as girls; and the use of popular community texts in the classroom. The construction of Aboriginality and masculinity is explicitly addressed within these
units. Alloway and Gilbert (1998) caution about the issues of adapting units to teach in different contexts:

'As with most classroom material, the units were produced for particular contexts by teachers who were aware of the specific institutional and social guidelines of their school sites.' (p.2)

Webb and Singh (1998) provide a male teachers' perspective on critical literacy for boys. They point out that their work has been informed by feminist theory and articulate their understanding of critical literacy pedagogy:

'In part, English teaching is about helping students to learn to read texts in socially critical ways. They need to be taught how to read between the lines, to seek out themes which may not be explicitly stated, to read for absences as well as presences, to decode the text in order to discover hidden or suppressed meanings. The processes of re-reading different genres is not necessarily the same: critical literacy is a complex social activity. Gender is part of the often 'taken for granted' stories that school texts have to tell ... The question is, 'How can we learn to read books written by males about men as if they are about making problematic issues of masculinity?' (p.141)

Webb and Singh (1998) conclude:

'(T)he aim of this strategy is to develop English classrooms that highlight and celebrate a wide range of masculinities, in particular literate masculinities.' (p.145)

### SUMMARY — BOYS AND LITERACY

Martino's (1997) research showed Australian boys perceive English to be a girls' subject, and oppositional to masculine activities such as computer games and sports. Australian boys act out abusive forms of masculinity as indicated by their use of 'othering' names such as 'poof' and 'loser'. Martino argues that heteronormativity helps police masculinity in Australian schools. Martino suggests the use of critical literacy to address issues of gender and masculinity with boys.

Coote's (1998) New Zealand replication of part of Martino's research found homophobic responses to be particularly evident in the responses of New Zealand boys.

A range of texts and teaching resources to support critical literacy work with boys are emerging out of the Australian research and development literature.

### 6.12 TEACHER GENDER

Wilkinson (1997) presented one argument for the possible magnitude of the gender gap in achievement at the Year 5 level in the IEA study. This argument was the 'culture hypothesis' that the poorer achievement of boys occurred because boys identify less readily than girls with the values of their predominantly women teachers. This explanation is somewhat undermined by the differential achievement of boys in different subject areas also taught by female teachers. The missing element in the teacher-gender argument is that literacy itself has been constructed as a gendered and feminine practice.

There were statistically significant relationships in the IEA study between teacher gender and student achievement. The 1991 IEA study showed that higher proportions of female teachers were associated with higher overall achievement rates. The results for the 1991 IEA study of reading literacy showed that there were higher proportions of female teachers teaching reading literacy in the highest scoring
10 countries both for Year 5 and Year 10 achievement. At the Year 10 level, the advantage of higher proportions of female teachers was strongly statistically significant. Although more female teachers were associated with higher overall levels of pupil achievement, Elley (1992) suggested that higher proportions of male teachers were evident for countries with lower mean achievement than New Zealand, but smaller gender gaps in achievement. Elley cited earlier research in the 1960s showing that boys in Germany surpassed girls in reading achievement when male teachers predominated in primary teaching in Germany.

**SUMMARY OF TEACHER GENDER**

Arguments that boys' poor performance in literacy are the fault of female teachers are problematic, given boys' higher performance than girls in other subjects taught by the same teachers.

More female teachers were shown in the IEA studies to be associated with higher student achievement overall.

In the early 1960s, when Germany had more male primary teachers than female primary teachers, German boys surpassed German girls in their reading achievement.

6.13 PARTICIPATION AND ACHIEVEMENT IN LITERACY EDUCATION IN SINGLE-SEX AND CO-EDUCATIONAL SCHOOLS

Wagemaker (1993) reported an analysis of reading literacy achievement in the IEA data at the Year 10 level by school type. The highest average scores on the narrative, expository and documents domains were achieved by boys from single-sex boys' schools. The difference between boys’ performance in single-sex and co-educational schools was most marked, with a disparity over twice that of the mean gap in performance between girls in single sex-schools and girls in co-educational schools. Wagemaker explained the differential findings as probably reflecting school selection factors. This explanation was supported by the much higher level of education of the parents of girls in single-sex girls schools. However, the educational level of the parents of boys in single-sex boys’ schools was not as high as that of the parents of girls in single-sex schools, yet the boys from single-sex boys’ schools were the group who did best overall. This finding may parallel the findings in the UK, where the highest mean performance for any group occurs in the elite boys’ schools. The finding is also important because it reflects a relationship between gender, social class and privilege that generates a pattern of high male achievement in literacy that is contrary to overall poorer performance of males in New Zealand.

Nash and Harker (1997) directly examined the impact of single-sex versus co-educational secondary schooling on girls’ English achievement by adjusting their data for pupil populations by initial ability, school mix and ethnicity. Nash and Harker (1997) found that there was no residual effect for school type and no significant advantage for girls’ English achievement by school type.

**SUMMARY — PARTICIPATION AND ACHIEVEMENT IN LITERACY EDUCATION IN SINGLE-SEX AND CO-EDUCATIONAL SCHOOLS**

The variation in literacy achievement by school type (single-sex and co-educational ) either entirely reflects school selection factors, or there is a varying effect for different schools at different times. Wagemaker (1993) found an effect that he explained as relating to school selection factors, although boys in single-sex boys schools performed best of any group. After adjusting for ethnicity and school mix, Nash and Harker (1997) found school type effects to disappear.
6.14 TEACHER EDUCATION AND LITERACY

As discussed in Chapter Three, teacher education is perhaps the most critical factor in literacy achievement. Darling-Hammond (1998) reviewed research by Ferguson (1991):

‘In an analysis of 900 Texas school districts, with a more extensive database than the Coleman study, Ronald Ferguson found that teachers’ expertise — as measured by scores on a licensing examination, master’s degrees, and experience — accounted for about 40 percent of the measured variance in students’ reading and mathematics achievement gains at grades one through eleven — more than any other single factor. He also found that every additional dollar spent on more highly qualified teachers netted greater increases in student achievement than did other uses of school resources.’

(Darling-Hammond, 1998, p.6–7)

What is particularly pertinent, given the intersection of issues of gender and ethnicity, is that:

‘after controlling for SES, the large disparities between Black and White students were almost entirely accounted for by differences in the qualifications of their teachers.’

(Darling-Hammond, 1998, p.7)

Fergusson and Ladd (1996) carried out a replication of their Texas study in Alabama, using rougher indices of teacher knowledge (high school grades and Master’s degrees, rather than teacher licensing examination scores), and found the same pattern:

‘sizeable influences of teacher qualifications (test scores and master’s degrees) as well as smaller class sizes on student achievement gains in mathematics and reading.’


‘a study of high- and low-achieving schools with similar student populations in New York City found that the differences in teacher qualifications accounted for more than 90 percent of the variation of student achievement in reading and mathematics at all grade levels tested.’


Because of the IEA studies, we have evidence that the qualifications of New Zealand teachers are also strongly related to student achievement in literacy. Elley (1992) reviewed New Zealand’s performance within a comparative analysis of the IEA literacy results for 28 countries. He found teacher education was one of the three policy indicators to show a strong relationship with higher literacy achievement at both primary and secondary levels. What Elley (1992) did find was that New Zealand teachers appeared not to be addressing the needs of diverse students in literacy.

Leading New Zealand teacher educators, such as Jeanne Biddulph, have been deeply concerned about the reduction of preparation time allocated to literacy in primary teacher training in the reduced three year primary training programmes. The Education Review Office (October 1999), in their review of pre-employment training for school teachers, found that time spent on English and languages varied between 280 hours and 400 hours across pre-service programmes.
There is little New Zealand research and writing available about the extent to which issues of gender have been permeated into literacy programmes within New Zealand teacher education. This matter is of some concern, because the international literature reveals two markedly different trends in literacy education: the mainstream approach and the critical literacy approach. In the mainstream approach, current writing about pedagogy in reading does not explicitly focus on the gendered and cultural structure of literacy. Issues of gender and boys’ reading and writing in particular are not explicitly addressed as central pedagogical concerns.

For example, a recently published joint position statement adopted in 1998 of the International Reading Association and the National Association for the Education of Young Children rendered issues of gender near invisible in the key publication *Learning to read and write: Developmentally appropriate practices of young children* (International Reading Association, 1998). Similarly, Braunger and Lewis’s (1998) *Building a knowledge base in reading* is largely silent on the gender issue throughout the text. In the light of the New Zealand research it is surprising that the Education Review Office (1997) publication *Literacy in New Zealand Schools: Reading* does not take up the issue of gender as central for New Zealand reading programme development. By contrast, the critical literacy approaches developed particularly in Australia place culture and gender at the heart of literacy practices in schools.

The recent attention given to issues of gender and critical literacy in the *English in Aotearoa* publication of New Zealand Association of the Teaching of English and the *Reading Forum NZ*, are positive signals that issues of gender are a focus for some New Zealand teachers at secondary level particularly. However, almost invariably the research cited is from overseas. We are struggling to understand how literacy and masculinities are positioned in relation to each other across the New Zealand school system.

An important indicator of the level to which understandings about the centrality of gender to literacy are pivotal to the work of New Zealand teacher educators will be evident in the Literacy Taskforce’s Report to the Secretary of Education.

**SUMMARY — TEACHER EDUCATION AND LITERACY**

Research consistently shows that the level and nature of teacher education is related to student literacy outcomes.

Teacher education was one of the three strongest policy indicators in the IEA literacy study.

That New Zealand education is not managing diversity well is evident in New Zealand having the widest home language gap in literacy performance of any country.

ERO has expressed concern about the wide variability in the attention to literacy in teacher education courses. We do not have information about the extent to which gender issues and critical literacy are permeating teacher education in New Zealand. A useful indicator will be the Literacy Taskforce’s report to the Secretary of Education.
Chapter Seven: Arts Curriculum

The New Zealand Curriculum Framework (1993) emphasised the arts as important to the 'growth of self-knowledge and self-worth in student’s:

'The arts are powerful forms of personal and social expression. They link imagination, thinking and feeling' ... and enable 'students to appreciate and understand their own heritage and other cultures.' (p.15)

The national curriculum framework specified that 'learning (in this essential area) will recognise the contribution and achievements of women in the arts, as well as those of men' (p.15).

The development of the actual curriculum statement for the arts has followed the others, and the arts curriculum statement is currently in draft form.

7.1 APPROACH TO REVIEW OF RESEARCH ON GENDER DIFFERENCES IN STUDENT PARTICIPATION AND ACHIEVEMENT IN THE NEW ZEALAND ARTS CURRICULUM

No systematic international comparisons of New Zealand students' performance across or within the arts have been carried out. The record of contract research studies funded by the Research Division of the Ministry of Education (1998) over most of the decade of this review includes no funded research focused on the arts during this period.

However, an invaluable source of information about the performance of students in the arts is available from a national sample of students assessed through the National Education Monitoring Project in 1995 and 1996.

Our systematic searches produced few articles; most of these focused on the use of the arts as tools to achieve outcomes in other curricular areas. Our written requests to all Colleges of Education, Polytechnics and University Faculties, Schools and Departments of Education seeking relevant research carried out by either students or staff on gender and education for the 1989–1999 decade did not elicit a single response in this curriculum area. Dr Airini (1999) reported that gender was not an issue that was mentioned verbally in the national report-back on the arts curriculum consultation process for the English version of the development. Gender was raised as an issue for Nga Toi in the consultative process. Clearly, the intersections of gender and ethnicity are deeply significant in the arts. Such is the case in the higher proportions of Pacific and Māori boys, who participate relative to girls, than is the case for Pakeha boys, who participate at much lower rates than Pakeha girls.

The dearth of such research literature and commentary on the arts may reflect relative marginalisation of the arts in compulsory schooling — in itself, a phenomenon reflecting gendered influences, as discussed below. This situation may also reflect the retrenchment of the arts in teacher education over the decade of study. As a result, Chapter Seven is short compared with other curricular areas. In the light of this context, our approach to this section of the review has been to:

1) review the materials which did emerge;
2) depend heavily upon international reviews;
3) draw upon research literature spanning a longer historical time period; and
4) give added weight to the few New Zealand studies uncovered through professional contacts.
More critically, we have endeavoured to identify the gaps, and to provide a coherent overview of the kinds of issues that do emerge, signalling future possibilities for research.

Not only is the New Zealand research sparse in relation to gender and the arts curriculum, but this is also the case for relevant international research on gender and the arts. For example, gender issues were not specified as a key finding in any of the 62 studies included in a 1995 ‘Compendium of research in arts education’. The 62 studies were reviewed by the Morrison Institute for Public Policy at Arizona University. Also, the large international meta-analyses of gendered practices, such as Kelly's (1988) meta-analysis of student-teacher interaction, tend not to have located or included research findings for the arts curriculum area. However, the relative lack of such literature is not seen by those who write in the field to be symptomatic of any absence of gendered issues in this field. On the contrary, a prevalent theme in the research is that the traditional identification of the arts curriculum as a feminine subject largely explains the invisibility and marginalisation of the field in educational practice and in funded research programmes. This marginalisation has been apparent in New Zealand in the ERO (1995) report on the arts in educational practice.

Four years prior to the focus decade of this review, Sandell, Collins and Sherman (1985) contended in the US context: 'That sex inequities exist in art and art education and that reforms are needed to bring about increased sex equity in art and society, are however, matters of general agreement' (p.299). These reviewers identified three key issues emerging: (1) the status of women in art and arts education; (2) sex-fair and sex-affirmative content and practice in art education; and (3) curricular equity for art in public schools. Since that overview was published, post-structural theory has been influential in developments within the arts, and some of the later research reviewed reflects this influence.

Sandell, Collins and Sherman (1985) reviewed evidence demonstrating that art as a subject has been assigned a feminine identification in United States culture — hence its low curricular and budgetary status as a 'feminine frill' (p.302). They argued that compelling evidence for this view, of the association of art with femininity, exists in mythological, analogical, and personifying beliefs about the nature and value of art (citing Garrard, 1976, and Wayne's 1974 article 'The male artist as stereotypical female'). It also exists in the wide association of women and art at the local community and school level, and the use of interest in arts as an indicator of femininity on early personality tests (citing Helson, 1966, and Tyler, 1947). They pointed out that although:

"serious" art study and careers take on masculine-identified values and purposes within the art world, men who work at these levels are often stereotyped as feminine, and art in the public schools is viewed as performing a feminine function with regard to the articulation and catharsis of emotion.' (p.303)

Sandell, Collins and Sherman (1985) expressed concern about sexist hierarchies within the arts curriculum, depending on whether a particular activity had been more traditionally associated with women's work. The fine arts and craft hierarchy is an example. They identified also the major issues of gender and cultural bias identified across the traditional curriculum areas, such as the invisibility and marginalisation of women's contributions within art history:

'Much art content that is taught is based on the white, Western, male viewpoint of art history and criticism.' (p.300)

The historical association of art as a feminine subject has been quite explicit in the history of early arts education in New Zealand schooling. In a landmark review of the development of art education in New Zealand Collinge (1978) noted that although drawing had been included as a subject in New Zealand schools from about 1840, it had been confined mainly to girls.
**SUMMARY OF APPROACH TO REVIEW OF RESEARCH ON GENDER DIFFERENCES IN STUDENT PARTICIPATION AND ACHIEVEMENT IN THE NEW ZEALAND ARTS CURRICULUM**

The national curriculum development in arts is the last of the curriculum developments, and the forthcoming document is currently in draft.

There has been little research in arts education during the decade. Gender issues for the arts are linked to ethnicity and culture.

Over the past decade, there has been relatively little research in arts education and gender. However, recent developments in the arts, and feminist and poststructural theory, have led to a new and emerging body of literature exploring the inscribing of culture and gender through arts.

A prevalent theme in international literature is that the traditional positioning of arts as a feminine subject largely explains its invisibility and marginalisation within educational practice.

The arts themselves are organised in hierarchical ways reflecting further gendered, and contrasting, patterns of valuing of craft and fine arts.

7.2 **DIFFERENCES IN ACHIEVEMENT AND ATTITUDES IN ARTS EDUCATION AT PRIMARY AND INTERMEDIATE LEVELS**

The National Education Monitoring Project assessment results for art tasks reveal few significant gender differences in performance. Boys did significantly better on a task requiring an observational drawing of a triceratops. This task appeared to be more attractive to boys. However, girls’ attitudes towards art were found to be significantly more positive than those of boys (Flockton & Crooks, 1996).

In direct contrast to most other curriculum areas, and to the results for music discussed subsequently, there were not marked patterns of differential performance at either the year 4 or year 8 level for school decile level or ethnicity. Small differences showing Māori performing more poorly at the Year 4 level disappeared in the Year 8 data, and Māori students showed significantly more positive attitudes toward art.

The New Zealand assessment data in music show that girls perform significantly more highly than boys at the primary school level, and that the impact of social class on music performance is far more substantial than the gender effect. Further, Māori students and students, from schools with higher proportions of Pacific students performed statistically significantly more poorly in music assessments on 25 percent to 40 percent of the assessed tasks.

The National Education Monitoring Project found all statistically significant gender differences at Years 4 and 8 to favour girls. Girls performed better on all three tasks (out of 20 music tasks) that showed significant achievement differences at the Year 4 level, and girls performed better on all four tasks (out of 20 music tasks also) for which there were statistically significant differences evident at the Year 8 level (Crooks & Flockton, 1997). The survey results carried out by Crooks and Flockton (1997) revealed that at both Year 4 and Year 8 levels girls' attitudes toward music and dance were more positive than boys' attitudes:

'Girls expressed a greater liking for music at school..., and for singing and dancing/moving as musical activities at school...and also indicated greater involvement in musical activities in their own time...They were also involved in more formal musical activities (lessons musical groups) outside of school.' (p.49–50)
Gender differences were less evident than differences by school decile level, which showed an increasing disparity as the level of schooling increased. At the year 4 level, there were statistically significant differences on seven out of 20 tasks, and on six of these, students from the lowest decile schools performed least well. Students from the 8-10 decile schools performed best across the tasks.

At the Year 8 level, students from the lowest decile school band (1–3) performed statistically more poorly on almost half of the music tasks (9 out of 20 tasks) (Crooks & Flockton, 1996).

Students from schools with more than 5 percent Pacific students did more poorly on 40 percent of music tasks across the Year 4 and 8 assessments. All instances of statistically significant differences in performance showed that students from schools with higher proportions of Pacific students did more poorly.

Statistically significant differences by ethnicity for Māori and Tauiwi students generally showed Māori to perform more poorly in music at both the Year 4 and Year 8 levels, except in the instance of one singing task, where Māori students at Year 4 level performed better than non-Māori. The number of tasks overall for which there were statistically significant differences between Māori and non-Māori was six, one less than the seven tasks for which gender differences were evident. Māori students performed more poorly on 25 percent of music tasks overall, in the primary assessments.

Māori students reported statistically significantly fewer opportunities to play musical instruments in music at school, and expressed significantly higher levels of enthusiasm for singing at school.

In summary, whereas art does not appear to stratify New Zealand primary students, music appears to be stratifying student achievement by gender, ethnicity and school decile level. At the Year 8 level, music assessments show students from low decile schools to be performing significantly more poorly on almost half the music tasks. Māori do significantly more poorly in music than non-Māori, and students from schools with higher populations of Pacific students also do significantly more poorly; but socio-economic status is the biggest differentiating factor. These findings suggest that cultural practices around particular forms of music, and access to instruments, may be implicated in the stratification of student performance in music.

At the secondary level, girls overall appear to participate more highly in the arts than boys but Pacific and Māori boys participate at higher levels than other boys.

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<thead>
<tr>
<th>SUMMARY OF DIFFERENCES IN ACHIEVEMENT AND ATTITUDES IN ARTS EDUCATION AT PRIMARY AND INTERMEDIATE LEVELS</th>
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<tr>
<td>The NEMP assessments revealed few gender differences in arts performance.</td>
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<td>Girls’ attitudes toward art were significantly more positive than boys’ attitudes.</td>
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<tr>
<td>In contrast with other areas, and notably music, there were not evident marked patterns of differential achievement by school decile level or ethnicity on arts assessments.</td>
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<tr>
<td>There is a consistent and marked gender difference in performance in favour of girls on the NEMP music tasks.</td>
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<tr>
<td>Students from low decile levels did significantly more poorly on more than a third of music tasks at year 4 and this gap widened for the Year 8 assessments.</td>
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<tr>
<td>Girls consistently liked music more than boys did.</td>
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Summary of Differences in Achievement and Attitudes in Arts Education at Primary and Intermediate Levels (continued)

Whereas art does not appear to stratify New Zealand primary students, music appears to be stratifying student achievement by gender, ethnicity and school decile level. At the Year 8 level, music assessments show students from low decile schools to be performing significantly more poorly on almost half the music tasks. Māori do significantly more poorly in music than non-Māori, and students from schools with higher populations of Pacific students also do significantly more poorly. But socio-economic status is the biggest differentiating factor. These findings suggest that cultural practices around particular forms of music, and access to instruments, may be implicated in the stratification of student performance in music.

7.3 RESEARCH ON PEDAGOGY AND ENACTED CURRICULUM IN ARTS EDUCATION

Norris (1999), in her consideration of 'music and masculinities', found that the perception of the arts as feminine is firmly established for New Zealand boys, both at preschool and at the outset of schooling:

'Sometimes boys practised what looked like a conscious avoidance of activities engaged in by teachers and girls. ... One prime example of this was music and dancing. During structured music sessions in the creche, certain boys invariably refused to join in and sat mutely. On several occasions in the kindergarten where musical activities were free choice, I noticed boys watching with amusement as girls and teachers danced — the boys seem(ed) amused by the spectacle.' (p.122)

Norris found that some boys were able to join in with music and dance by playing out a masculine Rolling Stones type variations on the 'cute, cute' version that the girls were enacting, reflecting Polhemus' (1998) arguments about the centrality of gender and culture to dance. Polhemus (1998) argues that dance constitutes the natural expression of culture, and that gender is inescapably implicated in dance. He suggests that the way popular culture inscribes and represents dance as a cultural practice constrains or permits dance, citing the movie Saturday Night Fever as bringing about a cultural shift in the place of dance in society. Recent theoretical work in the field of gender and performance in the arts offers understandings that have yet to emerge in the educational research literature concerning the arts (eg, Burt, 1995; Desmond, 1999; Dempster, 1998; Goodman & de Gay, 1998; Jordan & Thomas, 1998).

Costley (1993) carried out one of the few action research projects found in arts education. She reported on a secondary schools research project on Music and Education designed to develop and monitor anti-sexist classroom strategies and teaching materials. The group's purpose was to raise debate, and generate theorising about their contexts, in order to explain gendered processes. Gender bias in language became a major issue in the project. As incidents in music education emerged from the study, the group of teachers reflected upon the underlying issues:

'Then, in the last week of term, a boy brought in a tape for us to play which was a song about the rape of a woman. We did not allow this last and shocking incident to spoil the class atmosphere, and the boy was kept behind to be dealt with. We asked ourselves: What was it about this boy’s situation that had made him want to present us with this offensive music? ... Why did so many of the boys go around so aggressively name calling so much of the time?’ (p.201)

Amongst other reflections, they developed further understanding of the issue of a male gaze, through which women are constituted as the object of desire. These educators found that much of music is presented through the perspective of the male gaze. Their study developed a contextualised analysis of the politics of representation in music.
Mac an Ghaill (1994) explored issues of masculinity and positioning for working class boys participating in arts as a 'conventional feminine curriculum sector' (p.60) in his recent study of masculinity and education. The context of his research was a co-educational comprehensive secondary school located within an inner-city industrial area in the English Midlands. Mac an Ghaill (1994) found that, of the boys he designated the 'Academic Achievers', the sub-group of boys who participated in the arts and spent much of their leisure time in the drama department became publicly associated with the 'feminine' arts subject. Their participation in arts associated them with femininity, and made these boys the subject of bullying and harassment:

Ashwin: We were in the school band and they would really take the piss, saying we were girls because we carried round violins and that. And then we got into drama, the macho mob were very bad, everyday threatening and punishing us' (Mac an Ghaill, 1994, p.60).

Stephens (1996) deconstructed a transcript she recorded during a New Zealand study of fifth form boys negotiating masculinity and literacy. The context was one where the drama teacher had come into talk to a class of boys, to persuade them to take drama as a 6th form subject:

Mr D: ’... hopefully to break down a few ideas that you have, preconceptions about drama.
Nathan: (laughs)
Mr D: Unfortunately for many of you rugby is a very, very important part of your life, and because we don't run around in white shorts and long socks there's something strange about us. But believe me that's not the case. I'm about as fond of rugby as I am of anything. And we're not just poofers. ... while there is an enormous amount of interest in the junior school, the interest isn't there at the senior level ... because you've decided drama is for queers and weirdos' (p.176).

Stephens (1996) argues that Mr D defines a version of hegemonic masculinity that encompasses rugby, but excludes homosexuality. Mr D was evidently attempting to confound the arts/sport binary, but do so by positioning us real men as rugby playing dancers and them as queers. What positionings are left for gay boys within such discourses? Town's (1998) study of young gay men's experiences of schooling reflects similar dynamics at work in New Zealand secondary schools to those made explicit by Mac an Ghaill (1994) and Stephens (1996). Town (1998) reported that from James' perspective, the boys who did art history were the 'losers':

James: Most of the males were the 1st XV type in my school ... I didn't really like them ... there were people who did Art History that I could relate to quite well ... it was just accepted that there would be a group of losers ... not sporty types. (Town, 1998, p.163)

In Town's (1998) study, the oppositional relation between the 'feminine' arts and 'masculine' sports was thematic in the young men's interviews:

William: ... yeah I suppose I went more for music type things ... I enjoy music. Other than that, I got into bridge, but not team games. Like going to a team game. I think I sort of being involved, by not being involved ... you have to pull your weight in a team ... and it is generally guys and I don't think I would feel comfortable ... I know I never felt comfortable about doing PE. (p.167)
The resourcing exigencies for performing arts, and in particular, music instruction in New Zealand secondary schools commonly require that to receive advanced music tuition students are required to absent themselves from other 'mainstream' curricular subjects. Town's (1998) interviews with Sasha revealed that for him, music was a way of genuinely escaping schooling experiences that had become aversive to him. Also, participation in music and other related extra-curricular activities constituted a legitimate excuse that had enabled Sasha to absent himself from school for between 20 percent to 60 percent of his sixth and seventh form schooling, without his absences being at issue.

Anecdotal evidence indicates that New Zealand secondary schools such as Burnside High School have established a reputation for high status specialisation in music for both senior boys and girls. No research was available that investigated or explored these kinds of gendered and valuing issues in the arts curriculum area. Such research may be invaluable for making explicit the ways in which students' understandings of, appreciation of, and participation within the arts are limited and constrained by cultural framings that are deeply gendered and heteronormative.

In 1994, a US arts educator concluded that:

'Arts education demands a deep understanding about the range of diversity issues by all those concerned with schooling. A focus on the social reconstruction of all school subjects is emerging in teacher education programs(sic) and schools as educators begin to work together to develop this understanding. The future of art education will depend on teaching visual culture and interpreting vital social issues, such as those concerning gender, in school.'

(Freedman, 1994, p.168)

Some aspects of the emphasis on visual culture alluded to by Freedman (1994) may be included also within the English curriculum. The perspective articulated by Freedman (1994) is not yet apparent in the New Zealand literature.

Teacher-researcher Karen Dowling (1992) carried out an action research project in which she developed, implemented and evaluated a woman-focused art task in an intermediate art class in Christchurch. Dowling (1992) designed four components to the task:

1) An initial group task requiring four student groups to brainstorm artists' names. The resultant lists were fed back to the teacher and listed on the board. Students were asked to sort and classify the resultant lists to identify any similarities.

2) Four posters were presented to the class. Each the posters illustrated the name and work of four New Zealand artists: Robyn Kahukiwa, Anne Noble, Denise Copeland and Claudia Pond-Eyley. The four groups were also given four paragraphs, each providing a 'blurb' on one of the four artists, but without including the name of the artist. The students were required to match the name to the artist.

3) After further research and discussion, each group was required to present 'their artist' to the rest of the class, explaining how what was written about the artist and her life might relate to the images of her work.

4) A concluding brainstorm activity was used to engage students in reflecting in their groups on the similarities amongst the four artists. Their responses were fed back to, and discussed within, the whole class group.

The overall task was designed to enable students to become familiar with the work of four women artists in New Zealand; to enable the students to actively participate in knowledgeable discussion
about these artists; and to recognise commonalities in the work of the New Zealand artists. The task was also deigned to enable the students themselves to identify deficits in their knowledge of women artists.

The rationale for this task was linked by Dowling (1992) back to the fourth stage of a model of curriculum change proposed by Schuster and Van Dyne (1984), wherein women should be studied in their own terms (cited in Chapter 10 of this review). Dowling (1992) considered that her lead-in activity of the brainstorm would assist the students to work through the first three stages of Schuster and Van Dyne's (1994) model. That is, the students would note the absence of women and their marginalisation in their own prior knowledge and experiences. Dowling cited Alton-Lee and Densem's (1992) framework for a gender inclusive curriculum as guiding her approach to showing women as 'technically capable, creative and diverse people who are functioning as recognised artists in the community' (p.6). Dowling (1992) explained also that her selection of a woman-focus and task content would challenge the hegemonic constraints of traditional curriculum, and present the students with alternative experiences through:

'presenting and valuing a Māori woman artist whose Māoriness is beautifully reflected in her work, a pakeha woman artist who treasures Taonga Māori and demonstrates an understanding of oppression in her work, a Pakeha woman artist who uses a technically complex medium to focus on environmental issues and a Pakeha woman artist who uses a combination of techniques to create stunning images.' (p.6)

With reference to Doyle's (1983) review of research on the nature of academic work, Dowling (1992) argued that the disjunctions between the information the students encountered in the task and their own domain-specific knowledge would challenge their semantic networks defining what an artist is. Dowling drew upon Doyle's theoretical framework for classroom tasks to ensure the task design would provide students with new cognitive strategies for thinking about artists.

Dowling also explained that by using the brainstorm pedagogy, the risk of giving wrong responses would be lowered for students, as many responses would be appropriate answers. She contended that this approach would generate a safe task context for students to reflect upon gender bias.

In her evaluation of the task implementation, Dowling (1992) found that the initial brainstorm did indeed produce an androcentric response featuring in particular Rembrandt, Michaelangelo, Picasso and Van Gogh. One student later mentioned a woman — New Zealand children's story writer, Margaret Mahy. The students themselves quickly realised that the predominant commonality of the artists was their male gender: 'They're all male and they're all dead' (p.15).

Dowling (1992) considered, on reflection, that the task had been slightly too simple for the students, who had been able to match the 'blurbs' to the artists within 45 seconds. However, the concluding brainstorm and discussion revealed that the students had shifted their schematic understandings of artists as 'old' 'dead' 'men' and 'masters' to broader understandings including 'live' and 'women' and 'New Zealand'.

Dowling (1992) also reflected that, in terms of Brophy and Alleman's (1991) criterion of cost effectiveness of task design, that the costs were considerable and not feasible for a busy classroom teacher creating a 30 minute task. In the absence of readily available curricular resources, Dowling (1992) spent five hours on initial research and two and a half hours generating the posters and associated curricular resources. She perceived that, given the problems associated with locating relevant material and preparing the resources, most teachers would be constrained to resort to a male curricular focus simply for reasons of access and feasibility.
Graham (1999) published her study of the impact of a social-partner dancing programme on the self-esteem of 83 secondary students aged 12 to 18 years in the Auckland metropolitan area. She found positive and significant change in total self-esteem linked to positive change in self-esteem and positive changes in opposite sex relations. Graham (1999) reflects on the importance of having empirical research findings to support dance educator's perceptions that dance education can, under certain conditions, positively increase students self-esteem and facilitate physical, social, emotional and cognitive learning:

'It is also clear that given the time, suitable theoretical frameworks, designs and methodology much more about what dance students learn in dance classes may be found. In turn this immature frontier of knowledge might be opened up further, possibly supporting the place and value of dance in today's society.' (p.112)

In the light of the dearth of literature in this field, and the conditions of work for art teacher educators, Graham's (1999) impressive study constitutes a landmark development. It is timely also in the findings that male/female relations were enhanced through the dance programme.

Semrau and Boyer (1991–1992) pointed out that the intersection of the arts with technology provides opportunities for educators to address the needs of multicultural classrooms. They combined cooperative group pedagogy with the internet to structure tasks to enable students critically to evaluate patterns of gender and ethnic bias in instructional software. They suggest that the multiplicity of different art works accessible on the internet offers students better resources to support critical thinking. They suggest also that effective pedagogy can ensure a socially critical perspective on the construction of what counts as art in our cultures.

By integrating technology and arts education, educators may confound gendered associations of both curricula areas to the benefit of learning in each subject.

<table>
<thead>
<tr>
<th>SUMMARY OF RESEARCH ON PEDAGOGY AND ENACTED CURRICULUM IN ARTS EDUCATION</th>
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<tbody>
<tr>
<td>Research has found that New Zealand boys in early childhood, primary and secondary have difficulties participating in arts subjects (eg, music and drama) that are seen to be feminine and for ‘losers’.</td>
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<tr>
<td>Research has shown that boys who participate in the arts are subject to bullying and harassment.</td>
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<tr>
<td>Music curriculum reflects gendered regimes of valuing and positioning.</td>
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<tr>
<td>Traditional school music reflects broader positionings of male as subject and woman as object of male gaze.</td>
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<tr>
<td>Research is needed to document developments in music that provide valued positionings for boys.</td>
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<tr>
<td>One teacher researcher drew upon current research in task design to generate a task focused on four diverse New Zealand women artists. Her evaluation of the intervention suggested students had broadened their gendered understandings of the term ‘artist’.</td>
</tr>
<tr>
<td>A recent Auckland study by Graham (1999) showed boys' and girls' self-esteem and opposite-sex relations to improve in response to a dance intervention in PE curriculum.</td>
</tr>
<tr>
<td>The possibilities for integrating arts and technology have the potential to support diverse learners in multicultural programmes. Arts pedagogy needs to be carefully integrated into educational use of the internet.</td>
</tr>
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</table>
7.4 ‘ART’ AS ‘ON-TASK’ AVOIDANCE OF ENGAGEMENT WITH CURRICULAR CONTENT

In Chapter Four, the issue of student engagement with headings, margins, frames and other presentation features at the expense of curricular learning in other areas (eg, science) is discussed. Classroom studies have shown that some students who are achieving poorly, and in particular poorly achieving or under-achieving girls and boys, to spend many hours preoccupied with presentation (Alton-Lee, Nuthall & Patrick, 1993). We have suggested more research is needed. However, we have posed the suggestion that more explicit attention should be given to presentation as part of art work, to support instructional strategies in other curricula areas that focus on learning, and integrate presentation into other tasks in efficient and effective ways.

**SUMMARY OF ‘ART’ AS ‘ON-TASK’ AVOIDANCE OF ENGAGEMENT WITH CURRICULAR CONTENT**

Students can use design and presentation tasks to avoid interacting with other curricular areas. Reflective integration of arts and subject knowledge learning is needed to develop strategies that support students, both in their engagement with curriculum in other areas, and in effective strategies for presenting work.

(See Chapter Four for more discussion of this issue.)

7.5 ART AS A DIAGNOSTIC STRATEGY

Elsewhere, we have reviewed reports on the use of student drawings to diagnose the extent to which students' inner worlds, and perceptions of the world, reflect gendered understandings. For example, Nairn's (1993) analysis of secondary students' depictions of geographers, and Fournier and Wineburg's (1997) analysis of North American students' images of historical figures.

Chen and Kantner (1996) recently conducted a study with 33 kindergarten children (5.7 to 6.7 years), and 32 third graders (8.5 to 9.5 years). Their study was designed to evaluate the effectiveness of sex equity in education. They argued that if gender differentiation was found to be more prevalent in the 3rd graders' drawings than the younger children's drawings, the schooling would have been shown to have influenced gender stratification in their Missouri public schools. Alternatively, if gender differentiation was found to be less prevalent in the drawings of the older children, these researchers suggested that such findings would constitute evidence of effective sex equity programmes in junior schooling. Chen and Kantner (1996) reviewed a substantial body of research from the 1960s through to the 1980s, demonstrating the existence of gender differentiation in children's drawings. For example, they cited Harris's (1963) findings that girls and boys differed in their proficiency for drawing human body parts:

‘Harris's research (1963) revealed that when drawing a man, girls were superior on eye detail, proportion, clothing transparencies, body contours and hair, while boys were better on proportion of foot, indication of heel, nose, and portrayal of action of arms; when drawing a woman, girls were superior on most facial features, hair depiction and jewellery inclusion, neckline, waistline and skirt flare, while boys were better on the nose and were more likely to draw female legs with a distinct angle by separating the feet.’

(Chen & Kantner, p.44)
Chen and Kantner (1996) found that a range of research, including cross-cultural studies, found girls to draw more detail and better proportioned figures than boys (Maljewski, 1978; Cox, 1979; Reeves and Boyette (1983). Reeves and Boyette, (1983) found also that girls had a preference for curvilinear and round shapes while boys preferred angular shapes. In a study reported in the same year, Schulte (1983) reported that girls preferred sombre colours but boys preferred bright colours. Flannery and Watson (1995) recently examined sex differences in 114 young children's drawings in the United States. The assessed students for male and female-typed behaviour, irrespective of sex (using Bem's theory), and found the level of violence apparent in students' drawings to be linked to male typing.

Also evident in Chen and Kantner's (1996) review of several studies was the finding that young children showed a strong preference for drawing their own sex. The nature of the subject matter in cross-cultural studies of children's drawings was also found to reveal gender specific patterns:

'... between the ages of four and six, boys have thematic preferences for drawing monsters, dinosaurs, vehicles and space ships; but girls prefer kings, queens, princes, princesses and horse themes in their drawings. Hence, according to Feinburg, "girls favour subjects of an interpersonal nature such as friends, parents and children, while boys show an interest in objects and devices, including vehicles and mechanical equipment. Boys identify with themes of a heroic, extravagant nature and depict subjects associated with motion".'

(Chen & Kantner, p.45)

Chen and Kantner (1996) designed their own study to compare boys' and girls' drawings across nine dimensions: drawing skills, indoor/outdoor contrasts, people/object contrasts, real/fantasy contrasts, quiet/active contrasts, aggressive/non-aggressive contrasts, own gender patterns, curvilinear/rectilinear contrasts, and colour contrasts. These researchers found no statistically significant gender differentiation across seven of their nine categories. They judged girls’ overall drawing skills to be better than those of the boys in their study, but a second test of the data for the kindergartens revealed this difference not to be statistically significant, rendering this finding a somewhat unstable result.

The only clear gendered pattern found by the researchers showed that students preferred to depict figures of their own gender. Chen and Kantner (1996) found that any differences they did find at the kindergarten level markedly diminished in the drawings of the older students. For example, there was a 14.3 percent difference in the presence of theme realism between the kindergarten girls and boys, but by 3rd grade, this difference diminished to a level of less than 2 percent.

Chen and Kantner (1996) concluded that 'sex equity in education is a reasonable explanation for the changed proportion of boys' and girls' drawings in these variables between kindergarten and the third grade in this study' (p.49). Arguably, there could be other developmental and social influences providing at least a partial explanation beyond the school to explain this finding. However, in the light of previous research, these researchers perceived their findings to be evidence for the impact of school in lessening gender differentiation.

The prevalent finding that students prefer to draw human figures of their own gender (Chen & Kantner, 1996; Maljewski, 1978; Willson, 1977) contrasts with Alton-Lee and Nuthall's (1991) finding that standard three girls and boys drew exclusively male figures in their diagrammatic representations of medieval society. This use of evidence of children's drawings suggests that the male bias in enacted social studies curriculum in New Zealand may have interrupted students' tendency to depict their own gender.
SUMMARY OF ART AS A DIAGNOSTIC STRATEGY

Students’ drawing reflect their gendered experiences and interests.

Researchers have used patterns of change in gendered patterns in students’ drawing to understand gendered patterns and/or to evaluate educational interventions.

Gender specific patterns are evident, but these vary with different groups of students in different cultural and social settings.

One US study found the gender differences in students’ drawings to weaken over time. The researchers attributed this pattern to a gender equitable school programme.

New Zealand findings of marked patterns of gender bias may reflect gendered stratification patterns - particularly in social studies curriculum.

Students prefer, on average, to depict their own gender.

7.6 TEACHERS, TEACHER EDUCATION AND GENDER IN ARTS EDUCATION

Sandell, Collins and Sherman (1985) proposed a critical role for teachers in addressing issues of gender equity in the arts. For example, they suggest the following possibilities for teachers:

1) keeping a journal on classroom practices and interactions that reinforce or mitigate the stereotype that art is feminine, and that the feminine is of low value;
2) increasing the numbers of slides of women’s art, and introducing female and male role models for all sorts and levels of art occupations;
3) comparing the social and psychological impact of the women’s and Black art movements;
4) preparing a slide show on women’s and men’s leisure time art activity;
5) developing a visual literacy unit on gender and racial stereotypes in commercial art and mass media;
6) working with school counsellors on career education in art that eliminates sex bias in the interpretation of student interests, aptitudes, and aspirations; and
7) volunteering to review textbook illustrations and visual materials used in other subjects for their effectiveness or possible sex bias (p.313-314)

Their seventh suggestion is an example of the relatively frequent appearance in the literature of considerations of the use of the arts as a tool in diagnosing, addressing, or evaluating gender bias across the curriculum (eg, Chen & Kantner, 1996; Fournier & Wineburg, 1997; Nairn, 1993).

Blandy and Congdon (1990) contend that art educators need to develop critical understandings to use in deconstructing and critically analysing gender representations in visual representations. These authors point to pornography as a new site of concern for art educators:

‘... new questions about pornography will be raised, and new ways of thinking about women and men may evolve. We believe that within the field of art education, there is a preparedness for 'seeing' and assisting others to 'see' the pornography that exists in the images children, youth, and adults encounter on a daily basis. Art educators must develop teaching strategies so that these encounters can be informative and formative in a personally empowering and socially constructive way.’ (p.15)
In a consideration of the issues for 'Girls, Boys and Technology in music education’, Comber, Hargreaves and Colley (1993) reported their findings from a project at the University of Leicester. They found that boys are more confident in their use of music technology, and showing more interest in music, because of the link to technology. They saw the potential impact of a gendered stratification effect and pointed out that 'teachers have a crucial role to play in ensuring that girls are not disadvantaged in the use of music technology.

**SUMMARY OF TEACHERS, TEACHER EDUCATION AND GENDER IN ARTS EDUCATION**

Strategies, evident in the US literature to promote gender equity in the arts, reflect the influence of sex role type theories of the 70s.

Recent studies have focused on issues of (post-structural) theory, culture and body in arts education. The gendered construction of the visual provides challenges for arts educators. (eg, pornography).

Researchers from the University of Leicester warn that the differential gender and technology dynamics in using technology in music may have a gender stratification effect in favour of boys.

**7.7 SUMMARY, IMPLICATIONS AND PRIORITIES FOR EDUCATIONAL RESEARCH, POLICY AND PRACTICE**

There was very little New Zealand research literature available relating to gender and the arts for the 1989–1999 decade.

Research is needed to explain gendered practices, not only in the arts, but also in the representational systems of the culture and popular culture.

The cultural nature of art requires a consideration of gender within ethnic and cultural perspectives on arts.

Arts is positioned as a traditionally feminine curriculum area and on average, boys avoid it accordingly. The marginalisation of arts curriculum has been linked to the lesser valuing of the feminine. The valuing of the feminine in the arts, and the confounding of the traditional gendered association, are both strategies that should support the learning of girls and boys in the arts.

Contrasting patterns of NEMP results for music and art raise questions about the role of school music in stratifying achievement through the arts. An interaction between home and school may be occurring. Recent theoretical work across the arts, but particularly in dance, offer significant insights into the ways in which representational systems inscribe and reflect gendered identity.

The integration of arts and technology is seen as a potential vehicle for supporting student access to multiple perspectives and resources.

The arts provide both a tool and a site for consideration of cutting edge issues of gender, well-being and representation (such as pornography).
Chapter Eight: Technology Curriculum

Technology within the new national curriculum framework is described as pervading our daily lives at home and at work:

‘Technology is the creative and purposeful use of human knowledge, skills and physical resources to solve practical problems. It involves developing objects, systems or environments.’

(National Education Framework, 1993, p.13)

The National Education Framework (1993) specifies that this area of the curriculum has strong emphasis on both knowledge and skills:

‘Students will develop the capability to design and make, and to improve objects, systems, and environments in order to solve problems in some or all of the following areas: information and communications technology, electronic technology, bio-technology, materials technology, process technology, food technology, and design and graphics technology.’ (p.13)

‘Students will also develop knowledge about the types of technology available.’

(p.13).

The national curriculum also emphasises student development of competence and confidence in technology.

Technology education is presented as helping:

‘...to develop in students the adaptability required to function in a world of rapid change.’

(National Education Framework, 1993, p.13)

Technology education has shifted to centre stage in current New Zealand policy initiatives designed to use technology as the impetus for economic growth:

‘For countries in the vanguard to the world economy, the balance between knowledge and resources has shifted so far towards the former that knowledge has become perhaps the most important factor determining the standard of living - more than land, than tools, than labour. Today's most technologically advanced economies are truly knowledge-based.’


8.1 APPROACH TO REVIEW OF RESEARCH ON GENDER DIFFERENCES IN STUDENT PARTICIPATION AND ACHIEVEMENT IN THE NEW ZEALAND TECHNOLOGY CURRICULUM.

Technology has recently been explicitly identified as the platform for the new knowledge economy and the vehicle to rescue New Zealand from 'the Argentine disease' - the decline of a once prosperous economy - and our placement towards the bottom of the European OECD countries for per capita income (Minister for Information Technology's IT Advisory Group, 1999). Given the change in status afforded (technological) knowledge within the new economics (Romer, 1990 cited in Minister for Information Technology's IT Advisory Group, 1999), this area of the curriculum has taken on new import within the government's priorities. The importance of technology in the compulsory school
sector has featured in the submission to government of the Minister for Information Technology's IT Advisory Group (1999).

Technology is of special significance because it is particularly featured in current government policies (Bright Future, 1999). The technology curriculum area is perhaps the most significant for this review, because in itself this new curricular area has constituted a major intervention in gendered curriculum. The technology curriculum directly addresses both the public world of work and the private world of home. The bringing together of workshop technology and home economics under one curricular umbrella itself confounds these traditionally gendered curricula areas.

The American Association of University Women (1999) commissioned a report to update and assess progress towards equity against their synthesis in 1992 of more than 1000 articles on equity and girls' education. They concluded:

'girls tend to have a more cautious interaction with technology than boys — both within and outside of schools. For technology to fulfil its promise as a leveller of educational inequalities, more research needs to be conducted on the ways that males and females, both students and K-12 [kindergarten to grade 12] educators, are using computer resources.' (p.127)

The focus on computer access and literacy has been the predominant focus of research produced by our search strategies. Accordingly such research is the focus of this chapter. However, other issues of gender and technology that raise deeper questions about the intersections of the technological world, and the constructions of masculinity and femininity are emerging in research literature. Although such studies are relatively sparse in the literature, they signal important new directions for research and development in technology, and are given substantial weight accordingly. For example, Dixon's (1997) study entitled 'Pet’s tool: identity and sex-play in the design and technology classroom'.

In the course of reviewing the research literature produced by our search strategy for this decade, we found the research on gender and technology generally to be blind to intersections of gender and ethnicity. Little research on the educational experiences in technology of Pacific girls and boys or Māori girls and boys has been apparent in this critical period of the introduction of the new national curriculum in technology. This absence of New Zealand research on gender and ethnicity is of particular concern, given the evidence of the National Education Monitoring Project findings that there are significant performance differences favouring non-Māori and non-Pacific students in technology.

In addressing technology curriculum, the American Association of University Women (1999) posed three significant questions for educators and researchers to address when evaluating past practice and considering technology education in the future. Their questions provide a useful lens with which to interrogate our initial consideration of the National Education Monitoring Project findings on New Zealand student performance in technology:

'Gender differences must become part of the equity discussion surrounding technology now, before computers become integral to teaching and schools. Do plans for integrating technology into the public schools take into account the needs and experiences of specific groups of students? Are all students envisioned as creative "power users", or are students informally tracked into different relationships with technology based on sex, class, or other social characteristics?

How might technological products advance better - and more equitable -forms of learning and instruction generally?'

(American Association of University Women, 1999, p.127)
8.2 DIFFERENCES IN ACHIEVEMENT AND ATTITUDES IN TECHNOLOGY AT PRIMARY AND INTERMEDIATE LEVELS

In contrast with most other curricular areas reviewed, the overall performance of Year 4 and Year 8 girls and boys on the National Education Monitoring Project technology tasks was equitable. Boys scored statistically significantly more highly than girls on three tasks over the two levels (Crooks & Flockton, 1997). However, the nature of the tasks producing gender differences suggests possible reverberations of traditionally gendered effects. For example, boys did better on a task involving an electrical circuit and another involving an understanding of how a technological device works, while girls did better on a tasks involving generating a design for a sports bag and for a container for gift soap. No significant gender difference in performance on computing tasks were reported at this level (Crooks & Flockton, 1997).

Gender differences in attitudes toward, and access to, technology were evident, however, on the associated survey questions used in the National Educational Monitoring Project. Boys reported greater access to computers at home and at school at the Year 4 level, and greater computer usage out of school at the Year 8 level. This finding reflects Frith’s (1994) study of home computer access of standard 3 and 4 students (levels 4 and 5) in a large New Zealand city primary school. Frith (1994) found that 70 percent of boys had computer access at home, while fewer than half (49%) of girls had home access to a computer. This finding provides one indicator that Rocheleau's (1995) identification of a change over time for American students is not reflected in the New Zealand context. Using a national longitudinal study of 120 American students stratified on the basis of region and urban development, Rocheleau (1995) found that a year by year narrowing of a significant gender gap in computer access at home (favouring males) culminated in there being no significant difference in 1992.

As for the New Zealand research, Australian studies also indicate that home ownership of computers is strongly related to gender. Hickling-Hudson (1992) report Australian overviews showing 58 percent of boys to have computers at home, but 40 percent of girls to report having computers at home. The Australian gender gap was identified as wider between private school students by gender, with 73 percent of boys in private schools having access to computers, and 41 percent of girls in private schools reporting access to a computer at home (Hickling-Hudson, 1992).

The National Education Monitoring Project found that although there were no statistically significant differences in positive attitudes to technology between the younger girls and boys, by Year 8 boys expressed greater liking for technology and judged themselves to be performing better in technology (Crooks & Flockton, 1997). This finding is positive for boys, but of concern, because it reflects a possible negative change in girls' attitudes to technology as schooling progresses.

Whereas the assessment results by gender showed equal performance of girls and boys overall, the pattern for Māori and non-Māori show a consistent difference, whereby non-Māori students did better on about 13 percent to 15 percent of the technology tasks. The five tasks for which there were statistically significant differences between Māori and non-Māori students showed non-Māori to perform better in all instances, with the gap increasing slightly from the Year 4 level to the Year 8 level (Crooks & Flockton, 1997).

The highest number of statistically significant differences in the NEMP assessments were evident for students from schools with higher proportions of Pacific students, where in every case, students from schools with less than 5 percent Pacific student populations performed better (Crooks & Flockton, 1997). At the Year 8 level, this difference was most marked. Students from schools with higher proportions of Pacific students did significantly more poorly on 25 percent of the technology assessment tasks. Pacific standard two and three students were the ethnic group least likely to have
access to a computer at home of any ethnic group in the TIMSS study, with just over a third of these students reporting home access (Garden, 1997).

The differences by ethnicity apparent in the technology assessments are of deep concern. The comparisons by school decile level are the most substantial, and may suggest an interaction with ethnicity. Year 4 students from decile 1–3 schools did statistically significantly more poorly on almost 40 percent of the technology tasks. Year 8 students from decile 1–3 schools did statistically significantly more poorly on over 40 percent of the technology tasks assessed at this level. Students across these levels in the decile 1–3 schools did most poorly, students in the middle decile schools (4–7) did better than those from decile 1–3 schools, and students from decile 8–10 schools did better across the technology tasks (Crooks & Flockton, 1997).

Frith (1994) found that there was a relationship between parental income and computer ownership in her study of computer access of standard three and four students in a New Zealand city school. In his national longitudinal American study, Rocheleau (1995) found that heavier computer usage was associated both with high parental socio-economic status and superiority in grades. Hickling-Hudson (1992) reviewed a study of computer usage in 13 Australian secondary schools. She found that:

> 'wealthy Australian schools use their greater material and human resources to establish a relatively sophisticated computer education culture compared with poorer schools. Students from well-off families, especially boys, benefit most from high levels of computer education, and this is likely to equip them for elite jobs in societies which are increasingly rewarding advanced skills in the use of computers.' (p.1)

While the principals of wealthy schools in Hickling-Hudson's (1992) study were able to spend substantial amounts of money (in the area of half a million dollars) establishing computers, and had staffing that included sophisticated computing and technology capabilities, poor schools had relatively meagre material supports for computing and tended not to have highly trained staff in this area. One school located in a poor socio-economic area of Brisbane expressed minimal interest in computers in the curriculum and had available a budget of only $500 per year for all software and maintenance expenses. Although social class and wealth were the key factors in Hickling-Hudson's (1992) analysis, she identified related gender effects. Hickling-Hudson (1992) concluded that such inequity is a social and pedagogical outcome of the ways in which school computing has developed in Queensland. She concluded that there is a necessity for macro-education policy initiatives in Australia, to redress the role of information technology in education in further intensifying existing patterns of social privilege and disadvantage (Hickling-Hudson, 1992).

The National Education Monitoring Project findings, from their national sample of almost three thousand students, show school decile level to be associated with significant achievement differences in technology for 40 percent of tasks. Further, the gap appears to be increasing as children in decile 1-3 schools get older. These findings indicate that the effects of the differential human and material resources in rich and poor Australian schools identified by Hickling-Hudson (1992) may not be just reflected in New Zealand schools, but rather substantially more marked here.
SUMMARY OF DIFFERENCES IN ACHIEVEMENT AND ATTITUDES IN TECHNOLOGY AT PRIMARY AND INTERMEDIATE LEVELS

Girls and boys show gendered differences in areas of strength in technology, but performance is comparable overall. Gendered differences in areas of strength relate to tasks reflecting traditionally gendered associations.

Boys, on average, are more confident in technology and their confidence increases as they get older.

Boys have higher access to computers at home than girls. Although this gendered pattern in parental provision appeared to disappear in the US context in 1992, this gender gap persists in New Zealand.

The students who performed most poorly in technology are girls and boys in low decile schools. There is a direct relationship between higher performance and higher decile school attendance, with students in the high decile school range performing most highly.

The gap in performance between high and low decile schools is likely to exacerbate in New Zealand schools.

Access to computing at home is a critical issue for students, and poverty is a barrier to performance in technology. Access issues are exacerbated for girls from low decile schools, but are also a serious concern for boys in these schools. US research suggests that for older students, higher socio-economic membership relates to home ownership of computers, which in turn is associated with higher school grades.

The attitudes towards technology of girls and boys who are doing poorly in technology (low decile school attendees, Pacific and Māori) deteriorate between level 4 and level 8, as these children progress through primary and intermediate schooling.

Pacific girls and boys are particularly at risk in technology education.

Māori students as a group are performing slightly more highly than Pacific students, but significantly more poorly than Pakeha students and students from other ethnic groups.

The relationships between social class, ethnicity, gender and achievement in technology are a serious concern for a country attempting to generate a knowledge economy.

8.3 GENDER DIFFERENCES IN PARTICIPATION IN TECHNOLOGY EDUCATION

Of particular concern to the Minister for Information Technology's IT Advisory Group (1999) was the international comparison of technical graduates per 1000 graduates in 14 OECD countries, showing New Zealand to be producing the lowest rate of any country (19/1000). Australia, which was shown to produce the third lowest rate of technical graduates per thousand (66) still produced more than three times as many technical graduates as New Zealand.

Selby (1995) gave a perspective from her position in the Department of Information Technology at Waikato Polytechnic. She argued that the attrition of New Zealand girls in information technology as they progress up the school and into higher education is a profound concern. Selby (1995) reported her recent research commissioned by the Ministry of Education to explore issues of female participation in tertiary information technology education. She collected data both from local fourth form classes, and staff and students at the Polytechnic. She found that girls showed a lack of knowledge about career prospects using information technology, and women students lack confidence in spite of their successes. Also, there was an absence of women lecturers as role models. Selby (1995) found that there were problematic attitudes and behaviours evident in both students and staff who were predominantly male. Selby (1995) also identified as a key barrier in the New Zealand context 'the male-dominated computer culture with its 'macho' connotations' (p.26).
Technical drawing, workshop technology and graphics have maintained a place at the lower end of boys' ten most popular subjects over the 1986 to 1997 period (Praat, 1999). However, none of those choices featured in the ten most popular school certificate subjects of girls over the same period. For girls, typing and home economics were in the ten most popular subjects with home economics the least popular of these choices. This differential participation pattern by gender broadly continued into the sixth form. However, males and females were equally likely to take computer studies in the sixth form (Praat, 1999).

Because technology has only been introduced into the curriculum as an area in its own right since 1995 (Ministry of Education, 1995), it is not feasible to provide a direct analysis of comparative participation. Information and communication technologies are not provided as subjects for Bursary in year 13. The Minister for Information Technology's IT Advisory Group (1999) contend that this omission has an effect on subject choice at first year university level. However, they warn that the development of such an option would have to ensure that it was very broad in scope. What the review of research literature in this area reveals is the extent to which interventions have or have not been directed towards integrating information and computer technology throughout the curriculum. Accordingly, the key participation issue is not so much one of whether or not students are doing 'the subject', but a question of the extent to which technology is being effectively integrated throughout the curriculum.

There has been serious concern expressed in Sweden about the particularly low proportions of women students (between 5% to 10% between 1985 and 1995) taking computer science and engineering at Swedish Universities (Brandell, Carlsson, Ekblom, & Nord, 1997). More specifically the very recent trend for women's participation in Masters programmes to decline has led to radical intervention in the Swedish context. Brandell, Carlsson, Ekblom, and Nord (1997) hypothesised that 'women are repelled by the masculine culture surrounding computers and by the prospect of being a minority in computer education courses' (p.312). Accordingly they planned and developed a single-sex programme in information technology designed for women at the Luleå University of Technology from which the first entrants will graduate in the year 2000. They found that 'even though general opinion in Sweden is opposed to single-sex programmes there was strong support for a single-sex programme in information technology' (p.322).

What is remarkable about Brandell, Carlsson, Ekblom, and Nord's (1997) study are the processes of research, professional development and negotiation that preceded the intervention in order to gain support of key groups such as the university hierarchy, administrators, faculty, lecturers, the schools, the female students themselves, and in particular male students on campus:

'After gaining the support of the female students we turned our attention to the male students in the CSE program. From our experience of a project in the Department of Mechanical Engineering at Luleå University, we knew that negative reactions were to be expected from students who find special treatment for women to be wrong in principle.' (p.318)

Brandell, Carlsson, Ekblom, and Nord (1997) provided access to their research information about the absence of women in information technology, discussed the reasons for the approach and engaged in discussion with the male students about any questions or concerns these men had. These researchers perceived the programme to be successful, and to have the ongoing support of key groups, but they suggested that further evaluation would be necessary as the programme matured and produced graduates. Brandell, Carlsson, Ekblom, and Nord (1997) contended that the success of the programme had been dependent upon their preparation of key groups in the context and the model which integrated the programme into local systems.
SUMMARY OF GENDER DIFFERENCES IN PARTICIPATION IN TECHNOLOGY EDUCATION

By international comparisons, New Zealand is producing very few graduates in technology. New Zealand rates of 19 per 1000 were lowest within an analysis of 14 OECD countries.

Technical graduates reportedly have been predominantly male, although gender issues are not explicitly addressed in the 'Knowledge Economy' policy.

There is a need for statistics about participation in information technology to be routinely broken down into patterns of participation by gender, ethnicity and other influencing factors.

The absence of women in tertiary information technology has been linked to the male computer culture and attitudes of staff and male students.

Computing and information technology is currently not offered as a subject at 7th form level. This omission has been seen to influence New Zealand’s particularly low numbers of students specialising in this field at tertiary level.

Girls and boys appear to participate in computing at relatively equal rates at 6th form level, although traditionally gendered choice patterns operate for typing, graphics and technical drawing.

While girls and boys both have access to the new technology curriculum within the primary school, gendered differentiation by subject choice influences technology learning at secondary level.

Although both boys and girls participate in computer studies at sixth form level, both females and males participate at very low levels in tertiary courses. The participation levels are lowest for females.

A Swedish intervention was developed to increase participation of women at tertiary level in specialist training in information technology. A women-only information technology course was offered at university level and appeared to be successful, even though Swedish society is generally unsupportive of single-sex strategies. The effectiveness of the intervention was influenced by the involvement of key groups including administrators, staff and male students in the preparation.

8.4 TECHNOLOGY CURRICULUM AND MĀORI

The National Education Monitoring Project results as reported above indicate that a national sample of Māori girls and boys performed significantly more poorly than non-Māori on technology tasks. Fewer than half of the standard two and three Māori students participating in the TIMSS study had a computer at home (42%), 15 percent less than the proportion of Pakeha with computers (57%) or Asian students (63%) (Garden, 1997). While there may have been Māori girls and boys in the New Zealand studies of technology, these students were not generally identified by gender, and the intersection between gender and ethnicity in this curriculum area is not addressed in the research.

McPherson Waiti (1991) raised a series of issues of concern about and relevance to the development of a technology education for Māori students — girls and boys, and argued that such research needs to be carried out. Because the gap in performance between non-Māori girls and boys and Māori girls and boys appears to be widening as students get older in the NEMP results, the matter is one of urgency.

Waiti (1991) suggested that there are important issues for Māori girls and boys in the ways in which culture and technology are understood to interact. She pointed out that New Zealand students perceive Māori perspectives on technology to be fossilised in the past:

'I know my ancestors had to know about science to know when to plant kai (food), and when to go fishing, what stones to use for the hangi (oven) but at school we had to learn the real science ... not about the science my ancestors knew.' (p.187)
McPherson Waiti (1991) saw this perception of fossilisation of Māori language as linguistically inappropriate. She argued the need for national recognition of Māori as a living, communicative and growing language, that like other languages, and in the nature of language, would grow and develop to produce new vocabulary for science and technology. Just as certain English words and terms have been new additions to the language (for example: computer, microwave oven and compact disc) so have there been new Māori terms to name the new technological developments. For example: rorohiko (computer), ngaruiti (microwave oven) and kopaepae (compact disc).

Because new Māori terminology for technology has been developed frequently to imply the function within the name, there are particular pedagogical advantages of the use of Māori technological language (McPherson Waiti, 1990). For example, taonga kimi hua rahi (the object that looks for/ finds roads/pathways = compass), arai hapu (block pregnancy = contraceptive) and rino kukume (iron that pulls = magnet).

McKinley, McPherson Waiti and Bell (1993) emphasised the importance of the dictionary of scientific and technological terms (Te Taura Whiri I te Reo Māori, 1992) in supporting the new curricula in science and technology for Māori students.

McPherson Waiti (1991) described the ways in which a teacher who is a fluent Māori speaker could use Māori contexts to develop culturally and scientifically appropriate science and technology pedagogies:

"for example, a setting in this case may be a 'Tangi' where a range of content may be looked at, such as health and disease, inheritance, food (production, preparation, cooking, preservation) nutrient cycles and decomposers, hygiene and cleaning, water conservation, water and waste disposal, etc." (p.193)

Such an approach would also facilitate curriculum integration of technology, argued McPherson Waiti (1991), reflecting an indigenous pedagogy consistent with the wider international movement towards a Science, Technology and Society approach to teaching technology:

"Also within this setting, other aspects of life important to Māori people will make themselves obvious, for example Whakapapa (genealogy) Whanaungatanga (relatives, extended family), Mahi Tahi (all working together for the same end), Tikanga (customs), Turangawaewae (where you belong, are from)." (p.193)

**SUMMARY OF TECHNOLOGY CURRICULUM AND MĀORI**

Although Māori students did comparably more poorly on the NEMP technology assessments there appears to be little or no research available that specifically considers the experiences of Māori girls and boys.

The new Māori dictionary of scientific and technological terms is argued to be a key resource for technology education for Māori girls and boys. This resource can assist students to see Māori language as a living language that incorporates new technological language for developing technological concepts such as rorohiko (computer) as does English.

The development of an indigenous pedagogy for Māori that integrates technology learning with Māori cultural contexts is seen to be consistent with the international movement to embed technology teaching within a Science, Technology, Society framework for curriculum and pedagogy.
8.5 GENDERED CHANGES IN TECHNOLOGY CURRICULUM: AN HISTORICAL CONTEXT

Fry (1985) pointed out that:

‘The division of manual training, so that boys did woodwork and possibly metal work while girls were taught cooking, needlework and laundry work, was a practice that was rarely questioned from 1900 to the 1970s. There was no move of any significance to change this arrangement, which was maintained on the basis of convenience, and a belief in the division of labour according to sex.’ (p.108)

‘Its introduction as a matriculation subject for girls hindered their progress in scientific fields. Home-oriented courses provided useful alternatives for girls, but were hampered by being identified as low-stream, female alternatives.’ (p.191)

In considering the introduction of ‘gender equitable’ policies, Fry (1985) warned ‘concentrating on cooking for boys and woodwork for girls can cloud other issues of equality in curriculum’ (p.194).

Essentially, the policy implemented prior to the introduction of the new technology curriculum in 1993 was that boys did the girls’ subjects (such as cooking) as did girls, and girls did the boys’ subjects (such as woodwork) as did boys. The students had equal access, but the curriculum was perceived to be organised on the basis of traditionally gendered activities. This is argued still to be the case with the masculine associations of science and the feminine associations of English (see Chapters Four and Six). With the confounding of these traditionally gendered curriculum areas, the national curriculum policy constituted a major strategy for gender equity, and one that teachers doing action research prior to this time had found particularly effective with children. For example, Martin and Malham’s (1990) confounding of developmental activities in the junior school to generate ‘dress ups in rockets’ and ‘building tables to hold tea parties’ (discussed further in Chapter Ten).

8.6 HOME ECONOMICS, DESIGN AND TECHNOLOGY

8.6.1 Home Economics

Grima's and Smith's (1993) report of gendered interaction patterns for 65 students in four intermediate home economics classes in Dunedin was carried out just prior to the advent of the new technology curriculum, when home economics was taught as a distinct subject to both girls and boys. Grima reflected that in her original home country, Malta, home economics classes were still at that time only offered to girls. Grima's and Smith's (1993) study was designed:
Explaining and Addressing Gender Differences

Grima and Smith (1993) found statistically significant differences in the amount of help received by boys (76% of teachers' help) and the numbers of reprimands they received (87% of teacher reprimands):

'... boys and girls received a comparable amount of praise, but boys received a greater amount of interaction in all other categories (direction of teacher questions, choice of students to answer questions, call-outs and calling students by name), although these differences were not statistically significant.' (p.251)

These researchers reported differences in teacher perception and action:

'Both teachers gave the impression that they held equitable views on home economics education and they praised boys as often as they praised girls and expected the same standard of work from all of them. They reprimanded boys more because they misbehaved more, asked them to re-do jobs more often and helped them more.' (p.266)

Grima and Smith (1993) noted that teachers need systematic feedback to recognise the kinds of gendered patterns occurring, and to address them. They concluded:

'This study is not totally supportive of a view which sees home economics as a site for the breaking down of gender barriers.' (p.267)

Randall (1987) investigated the hypothesis that 'girls' reluctance to choose the physical sciences and technological subjects is their experience of practical work' (p.163). She investigated teacher-pupil interactions with second year secondary students during laboratory work in British 'Craft Design and Technology' classes. These appear to have been technology classes involving work with wood, plastics and textiles. She found teacher-student interactions patterns to favour girls, with girls receiving both more and longer contacts with the teacher on average. While the teacher initiated relatively the same numbers of interactions with girls and boys, girls initiated more help-seeking interactions. She found boys to be prominent in the physical arrangement of the laboratory, when they all grouped directly in front of the teacher for the initial demonstrations that were conducted by the teacher. She observed that girls tended to seek more private one-to-one assistance. Randall (1987) also found boys to be more independent and likely to get on with their work while girls asked 'What do I do now?' and cited danger or difficulty as reasons for not proceeding.

In a New Zealand journal, Canadian researcher Eyre (1990) published a reflective critique of gender-neutral approaches to home economics. She argued that so-called equal opportunity and gender free home economics curriculum could be linked to the prevailing ideologies of 'a post industrialist capitalist society, which is divided economically and socially, and which values individualism and moral relativism' (p.16). Eyre (1990) perceived that such a context was 'unlikely to promote a critical gender sensitive and gender-balanced pedagogy' (p16). Further, she argued that such gender-neutral approaches are not good for girls or boys and they are not good for society.

Eyre (1990) reviewed research and commentary showing male and other bias in the home economics curriculum. She identified evidence of her claim in the absence of the politics of health care in home economics curriculum, universal assumptions of heteronormativity, the use of the term 'work' as exclusive of work in the home and a range of other aspects. She also critiqued the prevalence of 'ideological familism', wherein 'too often the traditional nuclear middle class family is portrayed as the
ideal, and other family arrangements as anomalies' … a form of sexism' (p.15) (and classism) which ignores the reality for many individuals within families.

The alternative, Eyre (1990) suggests is a gender-sensitive approach which:

'recognises the experiences of women and men and draws on past actual (neither stereotyped nor ideological) experiences of both ... Rather than being biologically determined, gender role is recognised as a cultural construction which is, therefore, open to change. Students explore topics such as mothering, fathering, women and ageing, men and poverty, women and housing, men and divorce etc. Teachers are alert to the amount and kind of attention given to female and male students.' (p.15)

8.6.2 Design and Technology

Dixon (1997) provided one of the few considerations available in the research literature of the contradictory role of an incident of sexual harassment in constructing heterosexual gender relations of domination. Given that male domination of classroom interactions, and the 'bad behaviour' of boys towards girls, have been evident in the research on gender and education for over a quarter of a century, serious considerations of such behaviour and its relation to the construction of masculine identity have been woefully absent. Dixon (1997) argues that the failure to make explicit the role of sexuality in education, and in the literature, on boys and schools has contributed to such silence. The incident that Dixon used as the focus for her deconstruction begins when her video record captured the following incident during a Design and Technology class in an urban English working-class school:

'An 11-year-old boy approaches the front desk of the technology room to collect more artstraws for his tower structure. As he turns his back towards his workbench, he holds the ten or so 12" artstraws 'erect' to his groin, and as he moves across the room, thrusts his hips repeatedly forwards in a parody of copulation. When challenged by the teacher about this behaviour, he explains his surprise, 'It's only a joke!'.' (p.89)

Later, Dixon (1997) describes when the teacher is absent, Pete's use of a mallet, first to swing at people, then as a representation of an erect penis. Chas takes the mallet off Pete and 'masturbates' it and the boys 'rock with laughter'. Pete takes the mallet again and enacts fellatio. Pete then calls to Lyn and pings the mallet into an erect position pointed in her direction. He moves about the room and variously calls the names of girls and pings the mallet/'penis' towards them. Dixon (1997) noted that while the incident in part constituted sexual harassment and humiliation of the girls, no girl in the room confronted Pete.

Dixon (1997) found when she described the incident to women teachers in the school:

'none were surprised and many went on to describe an elaborate range of similar physical referencing of sex and the penis, from the 'subtle' use of rulers and pencils held in the hand and gestured with, through a wide-ranging and often violent repertoire of gestures and acts, to public masturbation.' (p.91)

Dixon's (1997) deconstruction of the incident using interview data from the students, provides a complex consideration of Pete's various positioning with girls. She describes how Pete used his short stature and a child-like voice to adopt a position as 'mothered child'. Dixon (1997) also cites Brittan's (1989) portrayal of dominant masculinity: 'a man is only a man so far as he is capable of using his penis as an instrument of domination' (1989, p.47) as explaining the way in which Pete's behaviour reflects his attempts to construct male practice.
Dixon (1997) also contends that the teacher's adoption of a 'child centred' educational discourse is an abdication from setting a positive cultural agenda. The teacher, she argues, creates an opportunity for students to rehearse and construct meanings of gender and power in oppressive ways (p.101). The school, she argues, was not providing an authoritative voice rejecting the objectification of girls and women. Finally, Dixon concludes that through not addressing such issues, we deeply fail both boys and girls:

'The absence of discussion around sex, sexuality, and the body in schools, and the silence of the teacher, the school and educational researchers around such acts neither supports girls in their challenge to Pete's phallic 'play', nor validates an alternative construction of the body and masculinity with which he can engage.' (p.103)

### SUMMARY OF RESEARCH ON HOME ECONOMICS, DESIGN AND TECHNOLOGY

The studies reviewed in this area were diverse, reflecting the major shift from the positioning of home economics before and after the intervention of the new curriculum.

Very little research has been carried out in technological education, other than computing and information technology.

One significant study signalling new research directions used the technology curriculum as a site to investigate intersections of sexuality, masculinity, harassment and male identity (Dixon, 1997).

New Zealand research in home economics revealed boys to elicit and receive more teacher interactions and more reprimands in this subject, although both girls and boys received equal amounts of teacher praise.

British research in craft design laboratory classes showed girls predominated in teacher-pupil interactions, but boys took up space in the front of the classroom during demonstrations. Girls received more and longer interactions with the teacher. Girls initiated more private help seeking while boys were more independent. Girls more frequently cited danger or difficulty as reasons for not proceeding.

These findings reflect gender-specific responses to subjects traditionally offered to boys or girls. Boys sought more help with, and were more disruptive within, home economics, and girls sought more help with, and expressed resistance to, craft design.

A gender-neutral approach to home economics has been critiqued for its failure to meet the needs of girls or boys, or society. Such an approach has been argued to perpetuate assumptions of ideological familism, focus on middle class stereotypes, heteronormativity, gender bias in the positioning of 'work', and individual and moral relativism.

Gender-sensitive approaches to home economics are advanced as an alternative approach to support gender-balanced pedagogy, the needs of both males and females, and critical thinking about the social and economic world.

A British study which deconstructs a boys' phallic 'play' in a technology class challenges the absence of discussion around sex, sexuality and the body in schools. Such silences on behalf of teachers, schools and educational researchers are argued to be failing girls in challenging harassment, and failing boys in that boys are not provided with alternative, less abusive constructions of masculinity.

### 8.7 RESEARCH ON TECHNOLOGY EDUCATION IN PRIMARY AND INTERMEDIATE SCHOOLS

Much of the research reviewed in this section focuses on issues of gendered patterns in student access to computers. Such patterns have been generated both by parental and caregiver preferences to provide
their sons more than their daughters with computer access at home, and the gendered participation processes by which (some) boys gain access to more resources within classroom communities.

The Minister for Information Technology's IT Advisory Group's (1999) research, using 1998 figures, indicated that the 'education sector is lagging behind others in its use of computers and the Internet … there was one computer for every 14 students in primary schools … and a low penetration of computers and networking connections in schools in New Zealand.' (p.20). The research suggests that such low access to computers in primary schools has generated a significant barrier to students, and teachers have encountered serious gender-related problems in their attempts to at least provide children with equal access to a limited resource.

Ostermann (1998) reported an action research study of issues of dominance in computer use within a new entrant class of five year olds. Her findings indicate that differential student access to computers in class remains as much a concern towards the end of the decade of study as it was at the outset. Ostermann (1998) collaborated with a postgraduate student to investigate student usage of the one computer available in the classroom. A simple rule called 'the name system' was introduced by the teacher to ensure that each child had equal access to the computer. The children's name tags were arranged in a vertical list enabling the child whose name was at the top of the list to use the computer, then move her or his name to the bottom of the list and so on.

The postgraduate student carried out observations of the first hour of computer usage. After viewing these Ostermann (1998) concluded:

'This first set of observations revealed that few girls wanted to use the computer and those who did waited patiently for a turn. One boy took virtually all the computer time, giving no one else a turn, thus totally hijacking the 'name system'. (p.51)

An important point made by Ostermann (1998) was that as a teacher of a class of five year olds, she was busy with reading groups and just not able to monitor the computer setting closely. The two researchers decided to interview the students about their computer usage, carry out more in-depth observations, and to design potential interventions to evaluate in action. The following are comments recorded in the interviews with children in Ostermann's (1998) study:

**Interviewer:** Why don't you go on it?

**Girl 3:** Because the boys are always on it and I don't get a go.

**Interviewer:** Do you go on the computer often?

**Boy 2:** Just once.

**Interviewer:** Why?

**Boy 2:** Those boys won't let me on.

The observations confirmed the interview findings that 'it was not only the girls missing out, but most of the boys too' (p.52). In the light of these findings, Ostermann (1998) held a class discussion with the children in which they discussed their ideas about sharing the computer, and the teacher developed a new rule sheet, including 'Rule 3. Share computer time. NO BIG BOSSES'. She allocated the children to single-sex groups for computer usage. Following these changes, the teacher and student observed the students at the computer. They found that the girls were approaching and using the computer more, and enjoying making printouts. The same success was not apparent in observations of the boys, where:
`The dominant one soon took control, switched programmes from the one specified, and `stayed at the computer ... A pecking order was established among the males, with some boys not able to gain reasonable access to the computer.' (p.53)

Ostermann (1998) perceived that her own computer competence could have been increased to help her be a confident role model, but noted that with such young children, her own time was needed across the class. Noting earlier research had suggested the presence of a guiding adult to be critical, she raised the possibilities of working with parent helpers to achieve more equitable computer use. However, Ostermann (1998) reflected also on the challenge involved in undertaking to train parent helpers in gender equity and technology. Ostermann's (1998) strongest conclusion from the study was the value of action research in providing a systematic and reflexive process for identifying and solving problems of equity and access.

Thomas (1989) reviewed research suggesting that the sex-related differences observed in primary children's use of microcomputers are not evident in preschool activities. She cited research carried out in the 1980s (for example: Lipinski, Nida, Shade, & Watson, 1986; Watson, Nida, & Shade, 1986) that proposed the use of microcomputers with young children as a strategy to modify later male dominance in microcomputer usage amongst older children. This hypothesis is an important one, that merits further research and particularly the use of longitudinal research design in the New Zealand context. Thomas (1989) pointed out that many myths about the use of computers in preschool settings have not been borne out in research. For example, the fear that young children would not participate in other free-play activities if a computer were present has been shown to be unjustified. The fear that the use of computers in preschool would lead to the isolation of children in solitary play has been unfounded, as pre-school children interact around and collaborate and cooperate when using computers. Thomas (1989) also reviewed research that provided evidence to discount doubts that young children would be physically able to use the computer, or manage symbolic language and representation on the computer. Thomas (1989) concluded that, while there is a need for much research about the social issues and attention to appropriate software: 'The microcomputer should not be considered as a thing apart, but as another potential activity for young children to experience and explore' (p.35).

In an intervention with nine New Zealand primary girls aged nine and ten, Hansen (1993) used a comparison of student behaviour when working individually or in pairs in problem-solving involving Logo tasks on a computer. Hansen (1993) found that students working in pairs focused more often and more quickly on the task. The discussion facilitated their problem solving, and required less support from adults. The individual working condition led to more errors and more dependence on an outside expert. Hansen (1993) perceived the discussion opportunity to enhance student processing and learning, and to free the teacher to be a more effective resource.

In a British study, Pryor (1994) suggested that even well-intentioned teachers undermine girls' confidence in gender-sensitive areas of school curriculum, like the use of computers. His theoretical assumption, drawing upon Walkerdine (1989) and Licht and Dweck's (1985) work in attribution theory, was that girls develop 'learned helplessness' because of the gendered nature of the social and educational environment, but 'learned helplessness' can also be unlearned, with changes in the environment. Pryor (1994) argued for the use of the Logo computer package to support girls' use of computers. He stressed the necessity for teachers to allow more time than usual in the curriculum, to promote and enable cooperation between students, and to involve students in peer evaluation processes.
Explain and Addressing Gender Differences

Brunner and Bennett (1997) summarized their findings from a series of studies at the Center for Children and Technology at the Education Development Center, New York City:

'We found, to nobody’s surprise, that girls are more ambivalent about technology than boys, who are more positive; that boys are more excited about their experiences with technology, particularly video games, while girls like video (i.e. stories) and tend to get bored when they encounter bad technology experiences. Girls are also less likely than boys to attempt to fix a broken piece of technology, and all the youngsters in this study talked about a male when asked about a "technology nut" they know.' (p.47)

Brunner and Bennett (1997) carried out further research with a range of informants (engineers, filmmakers, software designers and students), asking them to describe their feelings about and expectations of technology. They found very different and gendered understandings of technology, which they conceptualised as a 'feminine and a masculine 'voice' in the technological universe' (p.47). Although they concluded that not all women speak in the feminine voice or men in the masculine voice, the differences could be summarized as:

'Feminine fantasies are about small, flexible objects that can be worn or carried easily and that allow women to communicate and connect and to share ideas and stories. Masculine fantasies are about magic wands (or brain implants) that allow men to transcend the limitations of time and space.' (p.48)

Like Baker (1994), these researchers and commentators see the 'Science, Technology and Society' movement, which integrates science and social studies into curriculum, as a key strategy to creating an inclusive and meaningful technology programme. They emphasise the importance of engaging students in social studies, in reflecting upon their own gendered behaviours and ideas, and suggest the internet provides a technological context that attracts both genders (Brunner & Bennett, 1997).

Lai (1991) reported on an intervention to integrate technology and social studies through an attempt to introduce and integrate database activities into the New Zealand primary school social studies curriculum. The students in this study were 26 female students aged 10 to 13. Although Lai (1991) was cautious in making claims for the development in students of metacognitive skills, he observed that students' abilities to summarise, categorise and retrieve information improved as they constructed their own databases. Students were also taught to generate hypotheses and use the feedback from the database programmes to evaluate their decisions. Lai (1991) found that:

'The participants enjoyed the project and reported that they would like to spend more time working with computers in the future. They did not find it difficult to work with the computer (88% disagreed that it was easier for boys to use computers), and would even enjoy playing computer games (rather unusual for most girls).’ (p.62)

Lai's (1991) findings appear to reinforce a theme in the research literature that, when computer use is integrated meaningfully into the curriculum as a tool, students can enjoy the experience and benefit from the computer and software usage. It is also evident that the girls had access to very competent and facilitative role models in the teacher and researcher.
SUMMARY OF RESEARCH ON TECHNOLOGY EDUCATION IN PRIMARY AND INTERMEDIATE SCHOOLS: COMPUTERS AND INFORMATION TECHNOLOGY

There is considered to be a very low provision of computers to students in primary schools (1:14 ratio).

Much research in primary (and secondary) classes was focused on difficulties teachers had in managing access to computers for girls and some boys, because of the lack of sufficient resources, and the behaviour of dominant boys in monopolising scarce computer resources.

The research on technology and primary students rarely made evident the ethnicity or social class of the participating students. Although it is likely that Māori and Pacific students were included in the New Zealand research populations, they were not identified by ethnicity.

Virtually no research that focused on Pacific girls or boys and technology education was found.

Action research revealed that rules and systems for systematic turn-taking do not of themselves manage fair access to computer resources between girls and boys or between dominant boys and less dominant boys.

Arguments have been advanced for increasing the provision of computers in early childhood contexts, to assist students to develop skills before gender processes mitigate against girls' learning.

Sex-related differences in accessing computer resources do not appear to be as evident in early childhood as primary.

Computers, when integrated appropriately into the curriculum within a quality early childhood programme, are perceived to offer benefits such as social interaction and play with symbolic language and representations.

Carefully structured cooperative and collaborative pedagogies have been found to enhance girls' learning, and support positive attitudes toward information technology and computing software.

Gendered associations are considered to influence deeply the way girls and boys perceive technology and respond to technology education.

Many researchers have proposed integrating social studies and technology curriculum with (or without) science, in order to enhance students' engagement in technology education and critical reflection on their own gendered practices.

Meaningful integration of computer usage into the curriculum has been found to enhance girls' learning. However, these strategies were used only with single-sex girls' groups and not tried with primary boys in the literature accessed.

There is little actual classroom research focused on the experiences of boys in computing and information skills.

Although researchers perceived possible gains in learning and use of metacognitive skills through information technology, studies were not designed to focus on the links between learning processes and learning outcomes.

Further work could be usefully done on the role of computers and information technology in enhancing metacognitive skills in girls and boys.

8.8 TECHNOLOGY IN SECONDARY SCHOOLS

The Minister for Information Technology's IT Advisory Group's (1999) research, using 1998 figures, pointed out that there was available only one computer for every eight students in New Zealand secondary schools. Also, in 75 percent of secondary schools less than a quarter of teaching staff have
access to the internet. Although the resourcing for secondary schools has been higher than that for primary in this area the Minister for Information Technology's IT Advisory Group (1999) perceived the sector to be poorly served, and the 'education system to be lagging behind others in its use of computers and the Internet' (p.20).

Compared to other curricula areas, there has been more research into information technology in secondary schools. At the outset of our decade of study, New Zealand researchers, McKinnon, Nolan and Soler (1989) carried out a research study of a curriculum innovation focused on computers. There were three components to the curriculum innovation: integration of core secondary subjects, out-of-class activities which were the basis of in-class activities, and extensive use of computers using applications software. These researchers examined gender and ability differences in computer attitudes and experiences of a group of 176 high school students in third and fourth form (Years 9 and 10 level) high school classes, who were involved in the innovation.

McKinnon, Nolan and Soler (1989) found that for their sample, student access to a computer at home across SES levels had substantially increased, and the gap between low and high SES families had narrowed, compared with the results of earlier studies. However, they found boys had significantly greater access to, and spent significantly greater time on, computers at home than did girls:

'It is alarming, however, that within this changing ownership pattern, parents are purchasing computers for their sons and not for their daughters ... While females have significantly less access to computers in the home environment, inequality of access at school has been reduced for females in all but one of the classes surveyed, to the point where the difference is not significant. The exception demonstrates that the presence of computers available for student use at school on a one to one basis is an important though not sufficient condition of the establishment of equitable access'. (p.9, 10)

While acknowledging the impact of parents, McKinnon, Nolan and Soler (1989) concluded that the major focus for change was the classroom teacher who emerged:

'as a key variable, not only in resolving the issue of access, but in promoting positive attitudes towards educational uses of the computer. This is especially so where issues of access and use for boys and girls is at stake. (p.10)

Given the low level of teacher training in computer usage, identified in 1998 by the Minister for Information Technology's IT Advisory Group (1999), these findings are of concern. McKinnon, Nolan and Soler (1989) found that one teacher, working with the high ability classes, was neither confident nor competent in working on a computer, and expected the students 'to virtually teach themselves'. They noted that while the boys were able to draw upon sufficient previous experience to play with the computer and teach themselves:

'the females, confronted with the negative female role model and denied access, confronted negative attitudes towards using the computer which remained long after the study.' (p.10)

McKinnon, Nolan and Soler 's (1989) findings convinced them that the teacher must be effective in managing male dominance patterns in computer usage:

'teachers must be constantly vigilant in resisting males' almost incessant demands for attention and look to create environments where females' talents are nurtured equally and permitted to flourish ... both affirmative action and positive
discrimination are required. Only in this way will girls gain access to and use computers equitably in accord with their rights.’ (p.11)

McKinnon, Nolan and Soler (1989) found differential computer usage patterns between girls and boys. Boys spent less than half as long as the 15 minutes spent by girls using the typing tutor per session. Boys however, spent much more time engaged in computer games. These researchers judged girls to be far more task oriented accordingly, and boys to be using computers for playing rather than in an educational role. However, recent developments in the nature of computer technology and the World Wide Web raised the question: do boys in general better orient themselves to the future of computing technology as they play such games, while girls focus on their traditional preoccupations with neatness, presentation and writing?

McKinnon, Nolan and Soler’s (1989) intervention was designed in response to previous research which these authors reviewed at the outset of our decade of study. The research showed widespread inequities in the traditional use of computers in education:

‘Use entails access and traditionally, access is influenced by ability (in reality academic achievement), gender and socio-economic status. In general, research studies have shown that: more able students have significantly more access than less able students (Becker & Stirling, 1987); male students have significantly more access than female students both at home and at school (Lockheed & Frakt, 1984; Chen, 1986; Becker & Stirling, 1987; Latvika, Hesketh & Podd, 1987; Ramsay, Katterns & Lillas, 1987; Collins, 1988), and students from affluent backgrounds have significantly more access than students from less affluent backgrounds (Becker, 1982; Dubois & Schubert, 1986). Interaction effects compound each situation. For example, more able students tend to come from affluent homes and therefore have greater opportunity to own a computer. Less able students tend to come from less affluent homes and are less likely to get access at school, and they are also much less likely to have a computer at home. Being a female is a barrier to access, across all social levels at home and at school. Generally speaking, less computer time is given to lower achieving students and females in schools which emphasise programming and, high achieving males dominate computer use in all types of schools.’

(Becker & Stirling, 1987) (p.1).

The body of research initially reviewed by McKinnon, Nolan and Soler (1989) appears to be largely North American but their summary includes two New Zealand studies that were published just prior to the decade of study (Latvika, Hesketh & Podd, 1987, and Ramsay, Katterns & Lillas, 1987). In a study of computer literacy in 84 co-educational secondary schools in New South Wales, Crawford, Groundwater-Smith and Millan (1990) found that boys had much greater access to computers in-school, after school (while at school), and a much higher level of home ownership of computers. In his recent national longitudinal American study, Rocheleau (1995) found that computer ownership and parental interest in their children using computers were the factors which exerted the biggest impacts on the likelihood of students being heavy users. As in the earlier research reviewed by McKinnon, Nolan and Soler (1989) Rocheleau (1995) identified parental affluence as associated with high school student computer home access, which was in turn associated with superiority in school grades.

Scottish researchers Durndell, Glissove and Siann (1995) have recently reported findings of a study of students in five Scottish secondary schools, representing a range of populations. They identified persisting differences in gender and computing that reflect the New Zealand context rather than the United States' apparent cultural changes in attitudes towards girls and computers. Durndell, Glissove and Siann (1995) found that 'girls reported less experience of using computers at school' and 'boys
were significantly more likely than girls to own computers and also reported using computers more frequently outside school (p.219). Of more concern, an interaction of age and gender was shown for Scottish secondary students, where younger students did not endorse sex-stereotyped views; but the older the boys in the sample, the more strongly they endorsed sex-stereotyped views. They also found that the older the girls, the less positive their attitudes towards computers.

Crawford, Groundwater-Smith and Millan (1990) commented that there was a disparity between their data, revealing the comparative lack of access to computers for girls, and teachers’ attribution of girls’ passivity in the face of male dominance in computer usage as ‘lacking initiative’ (p.9).

Most of these studies document extant patterns towards the end of the 1980s. But a decade later, links in New Zealand between gender and in-and out-of school computer access, as well as affluence and out-of-school computer access, are still substantially and significantly evident for a national sample of students, as the NEMP assessment findings reveal.

Crawford, Groundwater-Smith and Millan (1990) also found a marked gender difference in the nature of Australian boys’ and girls’ use of computers, noting that boys wanted to play games and experiment. Such games were typically focused on males sports or fantasy war games. These researchers found that Australian boys were playing such games across the social classes, although boys from wealthier areas had more computers. They concluded that boys were bored and unchallenged by school educational computing programmes, in contrast to the excitement and enjoyment boys experience with sports or fantasy war games. Crawford, Groundwater-Smith and Millan (1990) also found a different response from Australian girls:

’In contrast, girls interviewed in case study schools generally saw computer games as an extension of arcade machines and part of the "male macho domain", where "nice girls don't go". They generally spoke of their brothers' games as boring, sexist or offensively violent.' (p.33)

Crawford, Groundwater-Smith and Millan (1990) recommended that policymakers and educators should give significant attention to the development of software games of interest to girls.

A study of junior high school students at Milton Keynes in the United Kingdom compared performance on traditional and gender-neutral software games packages (Littelton, Light, Barnes, Messer & Joiner, 1993). These researchers/developers found that when a gender neutral software game Honeybears was compared with the classic software game Pirates (formerly entitled King and Crown), the performance of boys was relatively unaffected - but girls' performance was 'far superior'.

Groundwater-Smith and Millan (1990) concluded, from their survey of 84 Australian co-educational secondary schools and in-depth case studies of six of these schools:

’The meaning of the term 'computer literacy', as it is evolving in schools, is being negotiated within the constraints of limited and largely unplanned access to computers by staff with little or no formal training, either in computer science or educational applications of information technologies. In the school context, the historical link between computing and mathematics appears to have narrowed the scope of curriculum and pedagogical applications. Both in the schools and in the wider community, computing is still seen as a generally male activity.' (p.48)

In a Dutch study of the impact of an education programme designed to increase computer literacy and information technology in 19 lower secondary classes, Volman (1995) found that the curricular intervention diminished differences in computer knowledge between girls and boys. However, gender differences in attitudes persisted, in spite of the programme. She observed gender-specific repertoires
and pupil behaviour and experiences in the classroom that influenced the students' gender identities. Volman (1995) suggested that:

'teachers should try to prevent an unintentional contribution to processes which exclude girls, or make girls exclude themselves from certain areas of knowledge and skills.' (p.1)

Boyd, Kelliher, Scott and Pech (1998) reported on a research and development project funded by the Ministry of Education which involved the integration of information technology into the accounting, economics and mathematics with statistics subjects at Palmerston North Girls' High School. It is interesting that the choice of subject areas for IT integration in this New Zealand study was consistent with Groundwater-Smith and Millan's (1990) finding that computers were generally introduced through mathematics in Australian schools.

Boyd, Kelliher, Scott and Pech (1998) found that, while there were some difficulties in the student use of computers because of poor initial keyboard skills, the computers and related software opened up a wide range of pedagogical strategies for the students across these subject areas. The students used spreadsheets, constructed graphs, and used statistical packages. These girls' internally assessed assignment marks improved, through the more effective presentation they achieved using word processing skills. For the final year of schooling, the students perceived some conflict between the computer technology and their Bursary examinations, in which such computer skills were not part of the assessed syllabus.

An interesting dimension of the integration of this IT programme through the curriculum was the care taken to ensure that the computer software opportunities were carefully integrated into a broad range of pedagogical approaches previously found to be linked to higher student achievement, including cooperative learning tasks. The authors saw the effects of the IT programme in facilitating the students' greater use of graphing as 'an expansion of possible learning styles available - for example, visual learning' (p.3), indicating that they saw the engagement of students in creating and viewing visual representations of data to be a strong positive outcome of the project. Statistics students expressed some concern that use of the computer to do calculations obscured for them the mathematical processes happening. This finding suggests the need for some educational purposes adaptation to the software package.

The major concern expressed by teachers related to the lack of provision of training for them as part of the development, and lack of accessible opportunities for training in IT appropriate for their needs as teachers. This concern is an important one in the light of McKinnon, Nolan and Soler's (1989) finding that the teacher's knowledge and competence are key variables in the success of interventions with students.

Houle (1996) found that gender did not differentiate student scores on measures of self-efficacy, computer attitude, computer anxiety, and cognitive style, for 235 students enrolled in an introductory computer skills course for business students in a private American university. Rather, previous experience, such as completion of high school spreadsheet and database courses, ownership of a computer, and having worked with a computer in a job, differentiated students on these scales. Given the American Association of University Women (1999) findings, these results suggest that gender may be operating as selection factor for girls during schooling, but no longer influences those girls who succeed in technology in their schooling on the kinds of measures used by Houle (1996).
SUMMARY OF RESEARCH ON TECHNOLOGY EDUCATION IN SECONDARY SCHOOLS

Research at the outset of the decade showed the gap in computer ownership between students from low SES families and students from high SES families to have narrowed, but this was not the case for comparisons between boys and girls. Boys had more access to, and spent more time on, computers at home.

Australian research reveals that teachers tend to misinterpret girls’ lesser experience with computers as lack of initiative.

The research on gender patterns in secondary schools shows that girls are increasingly penalised through their lower lack of access to computers at home; this penalty is compounded in their computer use in the classroom.

The international literature supports New Zealand research findings suggesting that secondary girls' attitudes to information technology tend to deteriorate as they progress through schooling, while boys’ attitudes are more positive. Interventions tend to increase girls’ knowledge, but have been less successful in influencing their attitudes.

Teacher competence was critical to the success of the in-class programme. The policy of leaving students to learn by themselves was particularly problematic for girls. Boys were more able to draw upon their additional home experience, and more likely to dominate computer usage.

There are conflicting reports in the literature about the value of boys’ propensity to use the computer to play games. While some researchers have seen this propensity as misdirected and undermining educational goals others have argued that boys have prepared themselves better for the nature of the World Wide Web through their game playing.

Secondary boys experience some computer software used at school as boring and unstimulating, compared to computer games.

Studies of the use of gender neutral forms of software indicate girls' performance increases when these forms are used. Boys’ performance is comparable on gender-biased software and gender-neutral software.

The effectiveness of educational software depends on the extent to which it is appropriately integrated into pedagogical approaches. A strength of computers is their capacity to offer students opportunities to use visual forms of information.

The introduction of computing into the curriculum through mathematics has been found to be problematic, because of the masculinist emphasis in student experience of IT.

Gender differences have been found to be linked to differential ownership of and access to computers, and the nature and extent of prior experience of computers, rather than to cognitive style.

While there was a broad range of research on gender and information technology, there was little research retrieved which explored issues of design and technical drawing, and development in technology.

There was no research retrieved which specifically focused on the experiences of Māori girls or boys, or Pacific girls or boys, in the area of information technology.

8.9 TEACHERS, TEACHER EDUCATION AND GENDER IN TECHNOLOGY EDUCATION

Throughout the review of research in this area, the issue of teacher knowledge and skill has been a prominent one. The Minister for Information Technology's IT Advisory Group (1999) acknowledged the October 1998 policy initiative in IT 'Interactive Education: An Information and Communication Technologies (ICT) Strategy for Schools'. This strategy aims to provide ICT professional development
for teachers and principals, and improve learning outcomes by the year 2002 through using ICT across the curriculum. However, this advisory group was concerned about the current state of teachers' knowledge, skills, access to resources and access to professional development.

'The problem starts in the teachers’ colleges, where until recently, large numbers of graduates have never worked with a keyboard. There is no requirement for teachers to be ICT-competent in order to be registered. Teachers lack access to telecommunications networks, and consequently lack ICT knowledge. It is imperative that teachers are able to access courses which enable them to come up to speed with ICT, and are provided with technical resources and support for ongoing development, to keep them up to date.'

(The Minister for Information Technology's IT Advisory Group, 1999, p.20)

With specific reference to gender issues, the recommendation most frequently emphasised in the literature has been that of professional development in information technology and gender equity, to enable teachers to be competent, and knowledgeable role models and guides. Gilmore (1993) reported on a follow-up evaluation of a teacher development programme in information technology delivered to 710 teachers in the Canterbury, Nelson and West Coast. The evaluation confirmed the value of the model used, which comprised an introductory cluster meeting, two school visits to individual teachers, and a second cluster meeting.

The evidence suggested that the programme's impact on teacher confidence, awareness and expertise in their use of a computer in the classroom had reasonably long-term effects. However, teachers needed ongoing educational support, and there was perceived to be a need for provision for technical support to schools also. A school-based model for teachers was recommended. Also, the issue of physical location and access to computers within schools was considered to be a major influencing factor for the integration of computer usage across the curriculum.

Some teachers raised issues of gender in the transcripts of cluster meetings included in Gilmore's (1993) evaluation. For example: 'Kerry finds that the boys are more dominant and assertive, often to the girls' detriment' (p.60). From the information available in the report, it does not appear that this professional development programme specifically addressed issues of gender equity beyond the critical issue of teacher competence. Groundwater-Smith and Millan (1990) recommended, for the Australian context, that gender equity issues be integral to the provision of professional development in information technology. This finding was also evident in research reported by Kirkwood, Elliot and Houston (1990), which is reviewed in depth in Chapter Four.

In their report prepared for the New South Wales Department of Education, Groundwater-Smith and Millan (1990) provided ten specific recommendations to assist gender equity in the development of computer literacy in Australian schools. Their first recommendation was for 'Sustained, school-focused in-service education for school staff and teachers' (p.50). They suggested such programmes should make apparent the use of computers as learning tools across the curriculum, and include information about girls' experiences of attitudes towards computing.

They suggested also:

1) dual coordination of school computing facilities, involving both a co-ordinator from mathematics and technology-based subjects, and a co-ordinator from the humanities and social sciences

2) more flexible and adaptable arrangements for resource access

3) additional summer school programmes for disadvantaged students
4) in-service courses for careers advisers, to make them aware of the career opportunities associated with computers

5) development of qualitative educational indicators to assess effectiveness of resources and resource support policies and practices

6) building codes to ensure that computer provisions are in designated neutral space

7) institutional and registration requirements for wide computer literacy across applications within pre-service teacher education

8) ongoing monitoring and evaluation of policy initiatives.

Frith's (1994) New Zealand study involved interviews with 96 New Zealand standard three and four students, and follow-up interviews with 51 parents. Her research provided a useful basis for drawing out implications about the interface between school and home in educational approaches to computer literacy. Frith (1994) made five recommendations:

1) That teachers encourage students to use home computers in their learning;

2) That teachers encourage children to publish school work on the home computer, and set systems in place to accommodate this practice;

3) That children without home computers be assured of effective opportunities to use computers at school (including teachers monitoring equitable usage by girls and boys);

4) That teachers become aware of and act upon the implications of the greater use of home computers by New Zealand boys;

5) That both teachers and the Ministry of Education should provide programmes to systematically develop computer skills.

SUMMARY OF RESEARCH ON TEACHERS, TEACHER EDUCATION AND GENDER IN TECHNOLOGY EDUCATION

Teacher competence in IT and technology is a key to student learning and attitudes in technology. Teachers need to be able to design effective programmes that support students (particularly girls) skill development in IT, as well as the use of applications.

Pre-service teacher education was identified as an area of marked concern, although there was no systematic research available about the nature of, and monitoring systems for, IT training among private and public providers of teacher education in New Zealand.

To address gender issues effectively in technology, teachers need to be knowledgeable and competent in technology education, and issues of gender equity. Professional development models which enabled networking, follow-up visits related to in-class application, and shared reflection, school-based models are recommended.

Gender does not seem to have been systematically integrated into professional development in information technology in New Zealand programmes.

Technical support for computing, and issues of access related to the physical location of computers within schools, have been identified as key factors.

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Summary of Research on Teachers, Teacher Education and Gender in Technology Education (continued)

Teachers can encourage parents to give access to computers to their daughters as well as their sons. Teachers can design programmes to be sensitive to the gendered patterns of student home access to computers.

Teachers are the key factor in the effective integration of IT across the curriculum.

Teachers need to consider a broad range of factors when implementing technology programmes, including: gendered dimensions in the use of space, access issues, material resources, technical resources, and human resources. Both quantitative and qualitative indicators should be developed to monitor, inform and support development.

In secondary schools, the gendered nature of traditional subject divisions should be countered and confounded by having leadership in information technology shared between curricula areas traditionally seen to be masculine or feminine. For example: literacy and mathematics or science and arts.

For teachers, the tools of action research, systematic monitoring and shared reflection are critical to effective responses to gendered processes in technology education.

Girls would benefit from knowledgeable input from careers advisers about the options available related to technology in the labour force.
Chapter Nine: Health and Physical Education Curriculum

‘Physical education, because it is centrally concerned with ‘work’ on the body, with the regulation and control of the body through both ritualised practices of sport and physical education lessons (Hargreaves, 1986) and through the scientific and medical rationales that underlie these practices (Vertinsky, 1990), becomes an important site for the study of the (re)production of gender difference within Western culture.’

(Wright, 1996, p.63).

The Health and Physical Education Statement occupies a unique position in the New Zealand Curriculum. At a global level, knowledge learned in the curriculum contributes directly to students’ physical, social, emotional and spiritual well-being and indirectly, to the well-being of society. More specifically, the skills and knowledge offered in this curriculum address recognised social problems such as unwanted teenage pregnancy, drug use, suicide and violence. Thus the curriculum offers a space for intervention with students in areas that are at once deeply personal but also of significant interest to parents, communities and the state.

To begin this section, a brief summary of some of the gendered patterns of health and well-being of young people in New Zealand is presented, followed by a review of available literature specifically addressing gender issues in the curriculum.

9.1 HEALTH AND PHYSICAL EDUCATION IN THE NEW ZEALAND CURRICULUM

With the publication of Health and Physical Education in the New Zealand Curriculum in 1999, the Ministry of Education replaced the health, physical education and home economics syllabuses, and drew together (most of) the contents of these previously discrete areas. The Health and Physical Education Curriculum is compulsory to year 10, and also provides a platform for programme planning in the senior secondary school.

Based on the underlying concepts of well-being/hauora, health promotion, the socio-ecological perspective, and the promotion of a set of positive attitudes and values for self-care and respect for others and the environment, the new curriculum offers a holistic approach to healthy living.

9.2 APPROACH TO THE REVIEW OF GENDER DIFFERENCES IN THE HEALTH AND PHYSICAL EDUCATION CURRICULUM

While the Health and Physical Education Curriculum addresses behaviour and well-being issues that reach beyond the school gates, our focus in this chapter is the contribution that the enactment of this specific curriculum makes to gender difference and gender equity. Wider issues of behaviour and well-being are taken up in Chapter Eleven.

We note here that, although a substantial literature exists with respect to the teaching of (some) of the seven learning areas encompassed in health and physical education, we were not able to locate many studies specifically related to gender, especially in a New Zealand context. The studies that we have located are heavily relied upon in this chapter. It is also worth noting that many of the issues arising from the literature are addressed in the new curriculum statement, but given its recency, there are no studies assessing the curriculum’s influence or efficacy in schools. We suggest this is an area open to future research.
SUMMARY OF HEALTH AND WELL-BEING STATUS OF CHILDREN AND YOUNG PEOPLE IN NZ

Boys in childhood and adolescence are slightly more likely than girls to be physically active. Young Māori are more likely to be physically active than young people of other ethnic groups (Hillary Commission, 1999; Statistics New Zealand, 1998b; Ministry of Health, 1999c).

Over 90 percent of young men and women self-assess their health as being good or excellent (Statistics New Zealand, 1998b).

Adolescent boys are more likely to report drinking alcohol and drinking it in larger quantities and more frequently than girls (Ministry of Health, 1999c; Statistics New Zealand, 1998b).

Adolescent women are slightly more likely to be smokers than adolescent men. Young Māori report higher rates of smoking than non-Māori, particularly young Māori women (Statistics New Zealand, 1998b).

Boys up to the age of 15 are more likely to report some form of disability than girls (Statistics New Zealand, 1998c). Arguably, in middle childhood, boys are more likely to have learning or behaviour problems while in adolescence, higher rates of disordered mental health among young women are accounted for by depression and anxiety disorders (Ferguson, Horwood & Lynskey, 1997). Boys are much more likely to be in receipt of Special Education Assistance for serious disabilities or learning and behaviour problems than girls (Moore et al., 1998).

Adolescent boys and young men are more likely to complete suicide or die from motor vehicle accidents than young women. Girls and young women are more likely to attempt suicide. Young Māori males and females are more likely to complete suicide than their non-Māori counterparts (Ministry of Health 1999a, b: Ministry of Education and National Health Committee, 1998).

After reasons relating to pregnancy and childbirth, young women (15–19 years) are most likely to be hospitalised as a result of external injury or poisoning — the primary cause of hospitalisation among young men. Reasons for hospitalisation among young Māori are similar to those of non-Māori; however, young Māori have higher rates of hospitalisation (Statistics New Zealand, 1998b).

Significant proportions of boys and girls are likely to experience some form of bullying or harassment at school. Overall, experiences of bullying differ with age, gender and ethnicity. However, boys may be more likely to experience being in a physical fight, while girls may be more likely to experience exclusion (Martin, 1996, 1997; Walker, 1998; Maxwell & Carroll-Lind, 1996). International studies suggest sexual harassment is likely to be experienced by a majority of female students (Stein, 1995).

9.3 PARTICIPATION AND ACHIEVEMENT IN HEALTH AND PHYSICAL EDUCATION

In 1998, the National Education Monitoring Project assessed health and physical education related knowledge, skills and attitudes of Year 4 and Year 8 students (Crooks & Flockton, 1999). Differences were found in students’ results with respect to gender, ethnicity and social class. At Year 4 and Year 8, girls scored significantly better on one of 23 and five of 26 health tasks, respectively. In the older age group, the health tasks in which girls performed better featured relationship tasks. The one item boys scored higher on at Year 8 related to knowledge about the heart. While there were no gender differences on the health survey at Year 4, girls were more positive about doing health at school and about the value of studying health at Year 8.

Significant gender differences were found on 15 of the 21 physical education tasks at Year 4, and 17 of 21 physical education tasks at Year 8. In both years, boys performed better on tasks involving balls or similar objects, while girls did better on tasks involving stepping through and around a ladder, balance, skipping and poi. At Year 8, knucklebones was added to this list for girls. With respect to attitudes to physical education, significant gender differences favouring boys were found at both year levels. At Year 4, boys believed they, and their teachers, thought they were better at physical
education. At Year 8, boys believed they were better at physical education, felt more positive about trying new things in physical education, and were more likely to indicate they wanted to do more physical education at school (Crooks & Flockton, 1999).

Māori/non-Māori comparisons of the NEMP physical education tasks showed Māori children at both year levels scored significantly better than non-Māori students on four of 21 tasks at Year 4, and six of 21 tasks at Year 8. These tasks involved object skills (ball, knucklebones) and skipping at Year 4. No differences were found in attitudes measured by the physical education survey. Māori students scored lower that non-Māori students on six of the 23 health tasks at Year 4, and 7 of the 26 health tasks at Year 8. Māori students at Year 4 were more positive about health in school on three of the four health survey questions than non-Māori; there were no significant differences at Year 8 (Crooks & Flockton, 1999).

Socio-economic differences based on school decile (low 1–3, medium 4–7, high 8–10) also showed different patterns with respect to health and physical education tasks. Four significant differences on physical education tasks were found in Year 4, with performance improving as decile grouping decreased. In Year 8, students from low SES performed best on knucklebones but worst on three tasks involving gross motor coordination and balance. With respect to health tasks, performance decreased significantly on 11 of 25 tasks at Year 4, with decreasing decile groupings. A similar pattern was evident at Year 8, with significant differences on 11 of the 29 tasks. Students from schools of low socio-economic status were more positive about health and physical education at Year 4 and two of the nine health questions at Year 8. There were no differences in attitudes toward physical education at Year 8 (Crooks & Flockton, 1999).

As noted above, schools are obliged to offer instruction in the Health and Physical Education Curriculum for all students up until Year 10 (form 4), and after this time it is optional. Physical education as an examination topic has been offered to students for both Sixth Form Certificate and Bursary. Praat (1999) found that, while the choice of Physical Education emerged as among the top ten topics offered by male students for examination for Sixth Form Certificate from 1992 and for Bursary from 1995, it did not feature in the top ten choices for female students. The only exception was for the year 1997, in Sixth Form Certificate. From 1992 to 1997, male students were between three to five percent more likely to offer Physical Education for examination in Sixth Form Certificate, and were around four percent more likely to offer physical education for Bursary from 1995. For male and female students, participation in physical education for examination has been below 20 percent over all the years discussed.

Research conducted in Australia suggests the main reason for young women’s lesser participation in physical education, beyond compulsory level, is that other subjects are considered more important for their careers (Browne, 1992). The authors note this finding is consistent with North American research.

**SUMMARY OF PARTICIPATION AND ACHIEVEMENT IN PHYSICAL EDUCATION**

Complex differences, with respect to competencies in physical education and health knowledges, were in evidence in the early years of primary school, patterned by gender, ethnicity, social class and year level. While there were gender differences favouring both boys and girls in physical education tasks at Year 4 and Year 8, Māori children outperformed non-Māori children on a range of tasks at both year levels, and children from low decile schools outperformed those from higher decile schools at Year 4.

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Equity concerns with respect to physical education have related to the lesser participation of girls and young women in physical activity and physical education (Bradbury, 1990; Hutchison, 1995); to the way in which the practice and pedagogy of physical education in schools implicitly perpetuates ideologies and discourses that construe women in passive and powerless or marginal positions (Burrows, 1994, 1996; Scraton, 1987; Williams, 1990; Wright, 1996); and to the way in which these positions contribute to negative health outcomes of both young women and young men (Kirk, 1995; Markula, 1996; White, 1996).

At the beginning of our period of interest, the literature was organised around notions that stereotypical beliefs of men’s and women’s bodies and sex-appropriate activities, structured and influenced the participation and achievement patterns of boys and girls in physical activity settings (Hutchison, 1995). Radical feminist analyses linked these ‘stereotypes’ to wider issues of patriarchal power, construing such beliefs as part of wider ‘ideologies of the physical’, implicit in cultures of masculinity and femininity that maintained asymmetrical power relations between men and women (Scraton, 1987).

Scraton (1987) for example, used ‘ideologies of the physical’ to refer to the different expectations about appearance and behaviour implicit in male and female sexuality. She examined how beliefs and pedagogies of physical education teachers in Britain in the 1980s perpetuated constructions of men as active, powerful and strong, and women as ‘bodily firm’ but, relative to men, weak, inactive and centrally concerned with their appearance. Her interviews with 56 teachers revealed pedagogies organised around the premises that boys were stronger than girls (despite evidence showing considerable overlap in abilities (Dyer, 1982)); that certain types of activity involving physical contact were inappropriate (eg, football) because girls bodies needed ‘protecting’ or that they were ‘unladylike’; and that girls were encouraged to have high standards of dress and decorum for physical education lessons that were not necessarily expected of boys.

Because the beliefs underpinning physical education itself were problematic, Scraton considered initiatives to encourage girls to take up physical activity (equality of access) inadequate; rather, she advocated a radical rethink for physical education, placing girls at the centre of the lesson. Scraton (1987) suggested girls should be encouraged to develop their physical potential, power and confidence, in an environment free of harassment from boys, and in ways that did not necessarily revolve around competition and contest. Equality required rethinking the ‘ideology of the physical’, which defined femininity in inferior passive terms, and masculinity in active and dominating terms.

Writing almost 10 years later within a post-structuralist framework, Wright (1996) found that feminine and masculine subjectivities (ways of being) in physical education were still being constructed as complementary/different, in ways that positioned girls as ‘lacking’ in some way, in comparison to boys (lacking in skills, toughness, courage, ability to withstand pain, the desire to ‘have a go’). In addition, being feminine was defined in such way as to link physical activity to slenderness and
attractiveness. For example, in the following quote from a teacher, the girls’ reluctance in physical education is linked to them being intolerant of pain or exertion:

‘I ... I don’t think they’re into pain, or they don’t like ... that feeling of being exhausted or having to try harder ... I think that’s the problem (teacher).’

(Wright, 1996, p.67)

In contrast to the teacher’s experience of girls as lacking enthusiasm and not wanting to exert themselves, around half of all the girls interviewed were involved in aerobics, weights and hydrogym classes outside of school. However, a construction of femininity as ‘lacking’, when it came to physical activity, was prevalent among the teachers and male students (Years 7–10) Wright interviewed. This construction existed in a context where traditional team sports and competitive endurance activities were the assumed criteria/reference point against which girls were judged; the sports that ‘counted’. In other areas, such as dance and gymnastics, many of the male students acknowledged the superior skills of the girls (unlike the teachers), but this area of physical activity was not considered appropriate to physical education lessons, being less active than team sports and belonging to a ‘social’ sphere outside of school.

The devaluing of physical activity in which girls were skilled, and the valuing of sports in which males tended to excel, meant that girls’ experiences of themselves was consistent with the dominant definition of femininity offered: fragile in comparison to boys’ toughness, less capable of effort, and less skilled than boys. However, some girls defined themselves in ways that made them independent of masculinist definitions of female inferiority, such as valuing the activities they were involved in, and drawing attention to boys’ lack of ability in these areas; these definitions existed in contradiction to the dominant and highly valued domain of ‘male’ sports.

Wright (1996) also found that girls’ investment in physical activity was linked to aspirations to a slender, tight body; a slender body signified a lack of faults, such as laziness and lack of will power. Rather than comparing themselves to female models, the girls in this study took the toned, slim bodies of their male friends as the standard. Wright points out that at no time did the male students in her study aspire to look like females, or link physical activity to physical attractiveness. The preoccupation with activity in pursuit of the ‘ideal body’, was the preserve of girls, a discourse that researchers have linked to the dissatisfaction and disorder experienced by women in relation to their bodies (see Markula, 1996 later).

Wright (1996) concludes by observing that the experience many girls had of their bodies as lacking in physical power and confidence, draws attention to the need for activities to encourage in girls a sense of their bodies as a source of strength from which to deal assertively with the world; essentially contributing to a redefinition of acceptable and desirable femininity.

The beliefs and practices structuring the ‘hidden’ physical education curriculum, identified by Scraton (1987) and Wright (1996), have been construed as a hangover from earlier periods of curricular development, where activities were demarcated along gender lines (Hutchison, 1995; Burrows, 1994). Writing of the American context, Hutchison (1995) noted three misconceptions about sport and gender, prevalent between 1900 and 1950, that served to limit physical activity for girls in schools to gymnastics, callisthenics and dance. Briefly, these misconceptions were a belief in ‘sex-appropriate sports’, supported by the notion that vigorous and competitive sports would encourage masculine traits in women, and that this form of exercise could be potentially harmful to women’s child bearing abilities. Burrows (1994, p.3) notes similar concerns about the sex-appropriateness of physical activity were apparent in New Zealand:

‘A concern to produce neat, attractive girls equipped with the requisite grace and finesse to enchant a man saw physical education for girls, until the 1950s,'
restricted almost solely to Swedish gymnastics, while boys were enskilled in a range of team and individual sports, and provided with programmes focusing on development of strength, agility and competitiveness.’

(Fry, 1985; Scraton, 1992)

Institutional evidence of beliefs about essential biological sex differences in New Zealand, specifically the belief that boys are naturally more physically active than girls, can be found in the differential space and facilities allocated to boys’ and girls’ schools (Jones & Jones, 1982; Fry, 1985 cited in Burrows, 1994).

With the demise in popularity of biologically-based notions of differences in what boys and girls could do, or should do in New Zealand and elsewhere, attention turned to the social reasons girls were under-represented in sports and physical activity. Local research (Bradbury, 1990; Creighton, 1992; Burrows, 1996) concerned itself both with the messages young women received from sources external to the school, for example, from the family, peers and mass media, as well from the ‘hidden curriculum’.

Drawing on her experience as an educator, as well as on the equity and physical education literature, Bradbury (1990) commented on aspects of the ‘hidden curriculum’ that maintained physical education’s status as “one of the most sexist areas of education in primary and secondary school” (p.26). Bradbury’s first concern was the assumptions, skills and beliefs of teachers of physical education. She noted that teachers may not reflect on, or be aware of, the assumptions underpinning the organisation or resourcing of physical education classes and, despite the ideal of student-centred pedagogy, she provided examples of teachers treating students according to their expectations of their ability as a ‘boy’ or ‘girl’. A further problem identified by Bradbury (1990) was the lack of ability of some teachers (particularly female teachers) to understand the reluctance on the part of some girls to participate in physical education. This she put down to the fact that physical education teachers were the success stories of school physical education and therefore had a “I made it, so why can’t you” approach.

Bradbury (1990) also identified an ethos of competition and winning, at the expense of skill development, cooperation and enjoyment, as off-putting for some students, and noted that lessons did not cater for the expectations of the diverse student population. For example, she asserted large numbers of teachers geared their physical education lessons to boys, for control and management reasons, which effectively marginalised the requirements of other students. Finally, Bradbury noted the lack of female role models in positions of authority or prestige in physical education or sport, a fact which reinforced the idea that physical activity was the preserve of men. The cumulative effect of these problems, was, Bradbury saw, a high drop-out rate in physical education, particularly among teenage girls. In addition, an environment was created in which young women did not experience a great deal of power or autonomy, but instead experienced self-consciousness about their bodies, and a loss of self-esteem.

Strategies suggested by Bradbury (1990)to improve participation in physical education included examining time-tabling to ensure that physical education lessons were available at times when girls would be encouraged to take part. At a content level, Bradbury suggested schools could de-emphasise competition, and place greater emphasis on participation, skills, and enjoyment. This phenomenon, she noted, was already happening with the introduction of Kiwi Sport in primary school. In addition, in order to breakdown the stereotype of physical education as a male domain, Bradbury suggested schools should aim for gender balance in their teaching staff. As a final suggestion, Bradbury recommended schools undertake action research to identify and eliminate the inequitable distribution of human and material resources.
Some of the issues brought to the fore by Bradbury (1990) and also Scraton (1987) and Wright (1996) have since been addressed in various contexts in New Zealand and beyond. For example, Creighton (1992) provided an account of how one teacher used ‘Breaking Through’, a teaching kit on equity and girls in physical education based on non-sexist pedagogy, with her intermediate class in Dunedin. As part of a wider unit on self-esteem and relating to others with a main theme of Games and Sports, the teacher found ‘Breaking Through’ useful in structuring a number of activities looking at the participation and beliefs held by girls and boys about physical activity.

While Creighton noted the children were in agreement that girls should be given a fair deal in sport, an aim supported by their school, she discussed the children’s finding that there were gender differences in participation in out-of-school physical activities. Creighton (1992) questioned whether the supportive messages received by children within the school were matched in the resourcing, opportunities and encouragement provided for girls outside the school.

In another class based intervention, Soper (1996) used action research to implement a feminist pedagogy into her teaching practice at an Auckland secondary school, with the aim of empowering girls and other marginalised groups in the class. Soper theorised the physical education class as a prime site, where assumptions regarding the biological determinism of masculinity and femininity that influenced teaching practice could be challenged. Starting with the action research model of ‘teacher as researcher’, Soper moved through three cycles of making observations, reflecting, planning, implementing, and observing and reflecting on her teaching practice in physical education classes. In the first cycle, Soper endeavoured to interact with girls as frequently as she interacted with boys. In the second cycle Soper changed the content of lessons to involve more cooperative minor games and avoid competitive activities in which males tended to dominate.

Through videotaping the lessons, she found reactions of the students were mixed, with many boys not liking, or responding to, the ‘new look’ physical education. In the final cycle, Soper attempted to democratise power relations within the classroom, so that students were more involved in deciding lesson content. While there was positive response to the final initiative, students lacked the skills to work in a more democratic way, so power sharing was limited. Soper (1996) noted the difficulty of trying to change teaching practice in an institutional culture which contradicted her goals. However, action research was found to be useful for examining practice, and connecting with the pedagogy literature. During the course of her action research, Soper was able to identify and work with instances of institutionalised sexist practices such as the language, activities and social relationships in her classes.

Writing six years after Bradbury’s (1990) article, Burrows (1996) voiced concerns about the state of gender equity in physical education in New Zealand, and outlined some of the problems faced by teachers of physical education. Burrows identified three reasons why equity concerns still needed to be taken seriously: first, research found that despite equity initiatives, ‘separate’ and ‘different’ continued to characterise girls’ and boys’ physical education programmes; second, there was a lack of evidence that theory was filtering through into the practices of physical education in New Zealand; and finally, while teachers were willing to take on gender issues, there was a lack of confidence in how to effect change, given existing structural and other constraints. In relation to the final point, Burrows related her own experience as a physical educator, noting that by far the biggest constraint to overcome in her classrooms were the gender-prescribed behaviours and expectations of her students. Observing that there were few models of ‘equity success’, and confusion over what ‘equity’ might mean and look like, Burrows examined gender equity strategies used in the past, and suggested some starting points for the future.

Beginning with the policy of inclusion, Burrows (1996) noted that an important consideration in implementing inclusion is to question the merit of the programme students are being included in.
Inclusion thus requires looking at whether the programme will meet the needs of the students to be included, and whether it promotes the sort of learning educators want students to undertake. For example, Burrows noted signs from women’s rugby culture that suggested women may be mimicking the least desirable behaviours of male rugby culture.

Burrows further observed that consensus, with respect to the benefits of co-education in physical education, had not been reached. She cautioned that mixed-sex classes had not necessarily been matched by an appropriate change in pedagogy. Finally, Burrows identified a lack of evaluative classroom-based research of published resources geared to gender equity in physical education, such as the “Breaking Through” kit developed by the Hillary Commission, and Physical Education New Zealand, and ‘A Fair Deal for Girls in Physical Education’ produced by the Department of Education (1989). Thus there was little evidence to attest to the efficacy or otherwise of such resources.

Burrows (1996) concluded by offering a range of examples of how gender equity could be addressed in physical education. Starting with ‘vision’, Burrows (1996) suggested educators develop an idea or philosophy of what it would mean to have gender equity in physical education. She suggested that talking with other physical educators about their successes could provide another place to start. Concrete ways for tackling inequity included working on language; for example, challenging sexist and homophobic remarks that police narrow versions of ‘gender-appropriateness’. Burrows also suggested that teachers reflect on how their own expectations of girls and boys and physical education could reproduce traditional gender relationships; for example, by focusing on how girls conducted themselves in physical activity, compared to boys’ achievements in classes.

A related teaching/pedagogical practice Burrows (1996) suggested is to ask whose interests are being served, or which students are being encouraged to succeed, by including certain activities in physical education; for example, when choosing between a module on rugby rather than dance or tai chi. How relevant are the skills being taught to the students? Burrows further suggests physical education is a particularly relevant site to encourage students to examine critically the sorts of messages broadcast about physical education and health by the popular media, programmes, resources and space allocation. Finally, Burrows noted that solutions would need to be worked out within local contexts, paying heed to the particular limitations and opportunities embedded therein.

International research of children at primary and secondary school lends supports to Burrow’s (1994) observation that students themselves have gender-appropriate ideas of what physical education and activity entails. Thus, even when ostensibly receiving the same curriculum (non-sexist/no barriers strategy), girls and boys will experience the curriculum, or position themselves in relation to it, differently (Williams, 1990; Kirk, 1995; Wright, 1996). This research picks up the point that children are active in negotiating the knowledge ‘received’ from the curriculum, and in terms of gender, have understandings of gender appropriate activity from an early age.

For example, Williams (1990), pointed out that although it is well established that at pre-puberty, there are no physiological differences to explain gender-related differences in activity level, differences nevertheless exist. In her interviews with 7–11 year olds in Britain, Williams found that the children were aware that differences in performance were related to factors other than innate differences. For example:

‘They don’t have much of a chance to do it (football) do they? I’ve seen a game where the ladies played the men and the ladies won and beat the men.’

(11 year old boy)

‘Some boys are better than girls (at gym) if they’ve been taught well.’

(10 year old girls) (1990, p.239)
Williams (1990) discussed a host of extra-curricular activities and experiences that reinforced the gendered expectations of boys and girls; for example, the greater number of opportunities for boys' activities out of school, the higher prestige and value of male sports, and domination of school playgrounds by boys. While Williams identified practices within schools that contribute to the gender division in physical activity, she noted that children’s investments in their masculine and feminine identities could make attempts to challenge gender stereotypes difficult. Thus, achieving equal opportunity or an anti-sexist approach to teaching required a “whole school, whole curriculum” approach, which demands more than simply treating boys and girls as if they are the same.

9.5 RESEARCH STRADDLING PHYSICAL EDUCATION AND HEALTH

Recent work on gender in physical education, drawing on feminist and post-structuralist approaches, has examined the way in which the body is employed by discourses of masculinity, femininity and physicality, in ways which perpetuate negative health outcomes for young men and women. For young women, this research has centred around the ways in which discourses of femininity and the body constitute ideals of physical activity, physical attractiveness, and slenderness, which create and maintain unhealthy ideals. For young men, concern has focused on the positions offered in the discourses of masculinity and body which result in greater risks of negative health outcomes (for example, greater exposure to injury and violence).

Kirk (1995) employed recent semiotic/post-structural approaches to the body, to explain the way male and female students negotiated the process of constructing their bodies in a badminton lesson in an Australian secondary school. Kirk supported his observations with reference to interviews with 200 local students. Kirk talked about the body being ‘in nature’ as well as ‘in culture’. While the notion that we have a body is unquestioned (in nature), Kirk (1995) draws on the argument that we use our bodies, and our bodies are seen to convey signs or messages about ourselves:

‘... flesh and blood bodies take on particular meanings. Bodies tell stories about self ... bodies are read and the signs they emit are interpreted by each of us, in the normal course of our daily lives, as a means of interpreting the kind of person we are encountering.’ (p.2)

Kirk (1995) construes physical culture as represented by the popular media (television, magazines, movies) as a “continually present resource which provide(s) students with points of reference for themselves and orientations to others” (p.3). Thus, physical culture through the media, in an important sense, regulates the perceptions of the sorts of bodies adolescents should have: certain degrees of slenderness and masculinity are looked upon favourably and considered to signify health, capability, self-control and physical attractiveness. Ideals of body pre-eminent in the media, along with the changes to the body experienced at the time of adolescence, make teenagers particularly aware of the signs their bodies are sending; teenagers, more than most, are considered to be consciously constructing ‘body’. Kirk (1995) read girls' and boys' differential engagements with the badminton lesson as their attempts to negotiate the ideals set up for the body in culture on the one hand, and meet the requirements of the lesson on the other. Thus, Kirk read girls’ minimal enthusiasm, and baggy dress code, as minimising the risk of exposing their bodies to scrutiny, while still meeting teacher expectations of participation. Kirk read boys’ boisterous, vigorous behaviour and tight/revealing dress codes as displays of their physicality and prowess.

The implications for schools, and health promotion, of these findings are that schools need to recognise how institutional sites such as physical education lessons expose and risk students' bodies, and thus identities, in ways that may limit the sort of health promotion/exercise considered desirable by the school. As practical interventions, Kirk (1995) suggests schools, in a range of curriculum areas, could critique various aspects of popular physical culture, and provide examples of the range of
healthy bodies. In addition, schools could offer more choice of activity in physical education classes, and possibly provide alternative environments (eg, single-sex classes), or credit students for activity taken up outside school, rather than in physical education lessons. Finally, Kirk suggests health promoters need to match their messages about healthy lifestyles to people's actual circumstances, and create environments in which people can participate in physical activity without risking their self-identity.

Similar calls to separate the socially constructed ‘ideal’ body from physical activity and health are echoed in New Zealand contexts. In a discussion of how the physically, fit female body is often identified (especially in the media) with the ‘ideal’ body (toned, thin, and young), Markula (1998) offered suggestions to physical educators on how to promote physical fitness without reinforcing the socially constructed ideal. Markula notes that the fit=slender=attractive ideal has been associated with increasing body dissatisfaction among young women, and an increase in eating disorders, in Western contexts. Like Kirk (1995), Markula suggests discussing the artificiality of the ‘ideal’ body with women, and the problems associated with it. She argues physical activity could alternatively be associated with improving everyday functionality, the enjoyment of movement, and social interaction. In terms of functionality, for example, Markula notes that many of the exercises promoted in gym classes are geared to helping women ‘look good’ (working on the lower body), rather than focusing on areas of the body where women’s strength could be improved (upper body, oblique stomach muscles). At a broader level, Markula (1998) exhorts physical educators and fitness professionals to be active in changing unrealistic ideal images, that tie fitness to attractiveness rather than health benefits.

The construction of the active, physically tough and competitive masculinity for young men, implicit in the research of physical education (Wright, 1996; Scraton, 1987; Kirk, 1995), has been linked to the higher rates of violence leading to death or injury (eg, suicide, homicide, motor vehicle accidents) among young men (White, 1997), and to sexual harassment and violence against women (Jackson, 1993). The theoretical glue most commonly used to bind the discourses of sport, health, violence and masculinity together in the masculinity literature is the concept of ‘hegemonic masculinity’ (Connell, 1995).

‘Hegemonic masculinity’ is discussed in detail in Chapter Eleven. By way of brief explanation, ‘hegemonic masculinity’ refers to the culturally dominant version of masculinity in any specific cultural and historical milieu; a version against which femininity and other forms of masculinity are generally subordinate or marginalised. The version of ‘hegemonic masculinity’ currently supported by institutions such as sports (McKenzie, Jackson & Dunstan,1993; Gilbert & Gilbert, 1998; Eder et al. 1995), the school (Connell, 1993; Gilbert & Gilbert, 1998; Kenway & Fitzclarence, 1997; Mac an Ghaill, 1994), and the media (Jackson, 1993), is endowed with physical power, competitiveness, autonomy and stoicism. It is defined by practices of compulsory heterosexuality, sexism and homophobia (Mac an Ghaill, 1994). This form of ‘hegemonic masculinity’ sets the standard for what it means to be a ‘real man’; a standard that leads boys to prove their ‘masculinity’ in ways that risk the health and safety of themselves (eg, ‘playing through the pain’; not talking about concerns) and the people around them (White, 1997; Gilbert & Gilbert, 1998).

The critique of masculinity/ies has been the focus of several interventions located in the health/personal development curricula in Australia, as teacher-educators and community groups seek to deal with some boys’ poor or destructive behaviour, and flagging achievement (Browne, 1995a, b, c; Shores, 1995). Resources to assist teachers to examine the way narrow gender ‘roles’ limit the opportunities and choices of students are available in New Zealand (Tasker, Hipkins, Parkert and Whatman, 1993). But we did not locate any research signalling the prevalence of their use, how they were used, or responses to them by teachers and students. Strategies for examining and teaching about masculinity and femininity are considered in Chapters Eleven and Twelve of this review.
9.6 SEXUALITY

While there is considerable research in New Zealand, and elsewhere, around the issue of teaching sexuality (e.g., Coggan, 1992; Cleland & MacKay, 1994) and critique of sexuality curriculum, because of the positions offered students, and the silences, particularly around gay and lesbian identities (Friend, 1998; Sears, 1998), few studies have examined the differential way in which health curricula related to sexuality are taken up by male and female students. The research of Quinlivan and Town (1999) represents the sole New Zealand study located for this review.

Quinlivan and Town (1999) deconstructed the learning experiences of young gay men and lesbians, in relation to sexuality education in the health and science curricula in New Zealand. Specifically, they discuss the role of gender in producing sexualities within binary frameworks of male/female, heterosexual/homosexual and normal/abnormal.

Quinlivan and Town (1999) note that the majority of their participants learnt about sexuality within science or health contexts, which focused on the anatomy of the body and reproduction. Within these contexts, physical bodies were separated from thoughts and feelings, which meant issues of identity (e.g., gay, lesbian, straight) were ignored. In addition, female sexuality was construed as passive in relation to active male sexuality, defined solely in heterosexual terms (see Gilbert 1996 in the Science Chapter). Mention of homosexuality in the curriculum often only came in the context of talk of HIV/AIDS. The teaching of sexuality within these contexts had some similar and some different implications for the lesbian and gay students.

For both gay male and lesbian students, these frameworks marginalised their emerging identities as gay or lesbian through the silence about them in the curriculum. For lesbian students, the silence was complete, as when homosexuality was mentioned, it referred to men only. The separation of the physical body from emotion and identity in the context of ‘active’ sexuality for young gays resulted in them perceiving their sexuality as something to be acted on rather talked about. Town (1998) notes the lack of opportunity to talk about their feelings was problematic for all the young gay male participants. Further, pathologising of physical expressions of sexuality for young gay men through their association with disease led to further distress for these students.

In contrast, the passive construction of female sexuality in relation to the body, meant that young lesbian students experienced their sexualities primarily in terms of crushes and infatuations. For some, the negative messages they received about their bodies, for example the ‘problems’ of menstruation and contraception, led to a further distancing of women from physical expressions of sexuality (Quinlivan & Town, 1999).

For all students, participating in the research helped them to talk about, and make sense of, their experiences and coping strategies related to being gay and lesbian in a largely hostile environment. Quinlivan and Town (1999, p.251) note:

‘The sharing of their perceptions enabled the participants to deconstruct their experience in the light of the heteronormative educational institutions they had attended. This deconstructive process is significant, as it demonstrates the importance of providing venues in which youth can explore possibilities, and where limitations and judgements are not imposed.’

As noted in the beginning, the holistic philosophy of the new curriculum statement allows many of the issues raised in the literature regarding health and physical education to be addressed. Further research is needed to identify and evaluate the impact of the curriculum statement on the teaching and learning of physical education and health in New Zealand. We have summarised the main issues arising from the literature in the text box below.
9.7 CONCLUSION

While both male and female students showed comparatively significantly greater achievement in physical education tasks, it is notable that from Year 4 in the NEMP findings boys are beginning to show more positive orientations than girls to physical activity in schools. While it is impossible to say from the data reviewed whether this gender difference holds for students of varying identities, in light of the explanatory literature reviewed in this chapter, questions should be asked about boys, and girls’ experiences of physical activity at school. What messages are boys and girls receiving about themselves as able-bodied, physically active individuals in school and beyond?

Notable also are the NEMP findings with respect to the health tasks. At Year 8, girls outperform boys on five tasks about relationships, and are significantly more positive about studying health. Taken together with the more positive attitudes of boys to physical education, and read in light of the literature reviewed here, these findings may indicate that girls and boys are already following a well-worn gendered path, leading some boys to negative (inter)personal and health outcomes, and leading some (a majority of?) girls to grow up worrying more about what their bodies look like, than what they can do with them.

While Quinlivan and Town (1999) show how the sexuality component of health education can work to perpetuate the binaries of dominant stories of (heterosexual) gender relations (male/female, heterosexual/homosexual, active/passive), further research is required to test whether the explanations tendered in the international literature are valid and useful in the New Zealand context.

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<tr>
<th>SUMMARY OF RESEARCH ABOUT GENDER AND HEALTH AND PHYSICAL EDUCATION</th>
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<tr>
<td>Differences with respect to competencies in physical education and health knowledges are in evidence in the early years of primary school, and are patterned by gender, ethnicity and social class. The social patterning of difference indicates that factors other than biology are implicated in their production.</td>
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<td>Students bring to school expectations of appropriate masculine and feminine behaviours, based on their gender, cultural and ethnic identities. However, schools, in conjunction with other institutions, play a part in reproducing gendered identities. Dominant versions of masculinity and femininity are implicated in the lesser participation of girls in physical activity, and their concerns about body image: for boys these definitions are implicated in negative health and interpersonal outcomes.</td>
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<td>Research demonstrates schools reproduce and communicate messages about the gender appropriateness of physical activity through:</td>
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<tr>
<td>• Pedagogies based on different expectations of male and female students;</td>
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<td>• Narrow choices of activities in class/valuing some activities over others;</td>
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<td>• Failing to challenge sexist and homophobic language;</td>
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<td>• Reinforcing values of aggression and competition at the expense of co-operation and upskilling students;</td>
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<td>• Failing to identify and work with the strengths of students — being non-inclusive;</td>
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<td>• Separating pedagogies for the body from identity and emotion;</td>
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<td>• Failing to recognise how social identity is linked to physical activity.</td>
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Implications for better practice include:

- Providing a range of activities for students;
- Valuing the sports codes students take part in;
- Balancing a focus on competition with co-operation, and skilling all students;
- Challenging sexist and homophobic language and other forms of aggression;
- Challenging unrealistic ideals of ‘body’ familiar to the students, and providing healthy, relevant alternatives;
- Providing students with critical skills, to challenge for themselves the narrow definitions of masculinity and femininity that limit their choices.

In New Zealand, an exploratory study of gender differences in acceptability of aggression in sport found males were more likely than females to find aggression acceptable in sport scenarios (McKenzie, Jackson & Dunstan, 1993). Because there were no reported gender differences in the length of sport experience, or level of competition participants, in which the participants were involved, the authors conclude the significant gender difference in aggression acceptability may be more likely to be influenced by the ‘type of sport involvement’. Men were significantly more likely than women to be involved in collision type sports (39% men, 3% women).

Survey based research, has looked at why girls, when given the choice, do not select physical education options. For example, Browne (1992) compared the reasons girls gave for participating; and not participating, in physical education studies in the final year of schooling in Australia. (1988 figures show 25 percent more boys participated in physical education studies than girls). The main reason for not taking physical education studies, cited by 95 percent of girls who did not take the option, was that other subjects were considered more important for their career, followed by time-tabling constraints (57%), and girls considering they had enough exercise outside of school (40%). Reasons relating to the course content, for example, a dislike of competitive sports, physical activity or the particular sports offered were indicated by 27 percent and 23 percent and 20 percent of girls respectively.

Feelings of inadequacy, such as not being good at PE, and embarrassment relating to lack of skills, were offered by around 23 percent of girls. Girls who did select physical education studies generally liked physical activity and keeping fit, enjoyed the classes and learning new skills (90% and above of respondents). Compared to girls who did not select PE, significantly more girls who did considered themselves to be of high sporting ability, physically fit, and fewer considered themselves overweight or underweight. Comparisons made by the authors with three similar Canadian studies, revealed girls thinking subjects other than PE were more important was also number one reason for not selecting physical education. Browne (1992) notes that the relevance of physical education studies to men’s careers is unlikely to be significant enough to explain the gendered participation rates; thus, other factors are likely to be implicated in the difference.

The dominance of men’s sports in the media, as well as the greater community support and resourcing for boys’ and men’s sports, is an issue consistently highlighted in the local and international literature (Bradbury, 1990; Creighton, 1992; Eder, Evan & Parker, 1995; Gilbert & Gilbert, 1998; Williams, 1990). The relative invisibility and implicit undervaluing of women’s sports is seen to perpetuate the sporty/active/masculine stereotype, in opposition to the un sporty/passive/ feminine stereotype, as well as being a site of material disadvantage for girls and women. Bradbury (1990) cites peer pressure to conform to ‘feminine ideals’ that contradict being actively sporty as influential in girls’ decisions not to participate in physical education.
Chapter Ten: Social Sciences Curriculum

Social sciences is one of the seven essential learning areas in the New Zealand curriculum framework. Social studies is the compulsory subject through which the social sciences are primarily taught from Year 0 to Year 10. As well as drawing upon knowledges and skills across the social science disciplines, this curriculum area specifically includes: learning in social studies, history, geography, and economics.

Social studies is a critical area of curriculum within this review, because it is through social studies that students’ formal education specifically inducts them into participation in our society:

’Social studies education aims to enable students to participate in a changing society as informed, confident and responsible citizens.’

(Ministry of Education, 1997b, p.8)

Also through the social sciences, students learn about people, diversity and social justice:

‘Students will examine the ways in which people from different culture, times, and places make decisions, and meet their physical, social, emotional and spiritual needs. Students will be helped to understand their rights, roles and responsibilities as members of a family and citizens in a democratic society.’

(Ministry of Education, 1993, p.14)

In addition to knowledge, this curricular area emphasises the development of critical thinking, communication and social participation skills.

The social sciences curriculum specification explicitly mentions that students will explore the ‘contributions and achievements of both women and men’ (p.14). Although the general policy statement of gender-inclusiveness in curriculum was first published in 1993, it was not until late in the decade of study, 1997, that the social sciences curriculum document was published.

10.1 APPROACH TO THE REVIEW OF RESEARCH ON GENDER AND SOCIAL SCIENCES

This chapter provides an overview of New Zealand research into gender and social sciences over the 1989–1999 period. A key study during this decade has been Carkeek, Davies and Irwin’s (1994) study of Māori girls in comparison with Māori boys in bilingual, immersion and mainstream social studies classes. The literature is contextualised within the national curriculum and the National Education Monitoring Project findings of slightly higher performance by boys in social studies. The substance of the chapter is organised within an in-depth study of research into social studies in primary, intermediate and secondary schools. Because this curriculum area is focused on the study of people, we use the insights arising out of this curriculum area research to help inform the other sections of this review.

10.2 DIFFERENCES IN ACHIEVEMENT AND ATTITUDES IN SOCIAL SCIENCES AT PRIMARY AND INTERMEDIATE LEVELS

The only statistically significant gender differences in social studies achievement found in the NEMP assessments of 1440 Year 4 students showed boys, on average, to score more highly than girls, on two tasks involving maps (Flockton & Crooks, 1997).

Gender differences were the least marked of differences by school decile level, ethnicity and gender in social studies achievement at the Year 4 level, while differences by school decile level were the most
marked. Differences by SES were evident for over half (10 out of 19) of the tasks: students from the lowest three decile schools performed least well, and students from the middle four decile schools (4–7) did slightly more poorly than those from high decile schools (8–10). There was one interesting exception. Students from the lowest band did significantly better than the medium SES group on a task requiring students to identify differences for New Zealanders living in different physical and social environments.

Māori students at Year 4 level were found to do statistically significantly more poorly on five of the 19 tasks. The NEMP assessments for social studies did not compare Pacific student achievement by ethnicity directly, but measured performance by proportion of Pacific students attending the selected schools. Schools with higher proportions of Pacific (or Māori) students showed statistically significantly poorer achievement on six of the nineteen tasks.

This finding signals a performance issue in social studies related both to ethnicity and school mix. The finding is of particular concern given the evidence from the Smithfield studies that ‘school choice’ policies have led to much greater differentiation of school populations by ethnicity and social class (Hughes, Lauder, Watson, Hamlin and Simiyu, 1996). On average, and although their achievement was lower, students from schools with higher proportions of Māori or Pacific students, had more positive attitudes to social studies learning than other students.

At the year 8 level, the NEMP assessments revealed that boys were still performing better overall on the assessment tasks than girls. Boys achieved, on average, statistically significantly higher results on six of 19 tasks. However, girls achieved more highly on three of the 19 tasks. These findings suggest gendered patterns of achievement by task type, with boys achieving more highly on map-related tasks. However, students from low decile schools performed statistically significantly more poorly on 19 of 26 tasks at the Year 8 level.

The difference between Māori and non-Māori achievement widened markedly from Year 4 to Year 8, with Māori students performing statistically significantly more poorly on 14 of the 19 tasks at Year 8 level. The exceptional finding that Māori students performed statistically significantly more highly on a question focused on the topic “Marae” signals a major issue related to curriculum in the performance of Māori students in social studies.

By Year 8, the greater positive attitude towards social studies of Māori students evident at the Year 4 level had disappeared. By contrast, students from schools with higher proportions of Pacific students were still more positive in their attitudes to social studies and their performance was comparable to those of other students. However, the absence of data for Pacific students, by ethnicity, in the NEMP studies, does not allow clear conclusions to be made about the social studies performance of these students.

**SUMMARY OF DIFFERENCES IN ACHIEVEMENT AND ATTITUDES IN SOCIAL SCIENCES AT PRIMARY AND INTERMEDIATE LEVELS**

In social studies tasks, boys do significantly better than girls at primary level.

Although the gender difference in favour of boys in primary social studies is relatively low at Year 4 level, the gender disparities increase.

At year 8 level, social studies assessments reveal particular areas of strengths for both boys and girls. Boys do better on mapping tasks.

.../continued on next page
**Summary of Differences in Achievement and Attitudes in Social Sciences at Primary and Intermediate Levels (continued)**

Social studies is a curriculum area where the stratification of patterns of achievement compounds markedly as primary schooling progresses.

Students from low decile schools do significantly more poorly on more than half of the NEMP tasks at Year 4, and more poorly on almost three quarters of assessment tasks by Year 8.

The gap between Māori and non-Māori students' achievement in social studies widens markedly through primary schooling, with Māori students' attitudes decline as schooling progresses.

Pacific students appear to be achieving more poorly than non-Pacific groups in social studies, although these students' attitudes to social studies appear not to deteriorate.

Māori students did significantly better than non-Māori on a NEMP task using a marae as a context, indicating that differential achievement may be strongly culturally influenced.

Rather than supporting the achievement of a diversity of students, social studies actively stratifies student achievement. This finding is a strong concern in a curriculum area that aims to value and support diversity.

10.3 **CURRICULUM**

The development of a gender-inclusive policy and curriculum statement for social studies specifically, was seen to be long awaited by Hunter (1993) and Benson (1998). Benson (1998) noted that not only was the outdated 1961 Social Studies Syllabus limited in any scope for including female experience, but the more recent 1977 Syllabus Guidelines were framed through male generic language. Hunter (1993) pointed out that the extent of male generic language usage in the:

>'1977 Syllabus Guidelines suggests that social studies is about the nature, history and society of man. An example, expressed in the Form 1 Cultural Differences reads, 'Each person acquires the culture of his group as he lives and learns within it. By his conscious and unconscious choices, he helps to maintain and modify it.'(p.8)

These commentators did not see the male bias in curriculum as positive for boys in social studies. Benson (1998) commented that 'the stereotypical expectations placed on males by New Zealand society' were cause for concern for the committee involved in the Curriculum Review in 1984. Benson noted that issues of masculinity are central to a curriculum that is concerned with people and participation in social groups:

>'Boys are under constant pressure to compete and succeed. Too often, there is more emphasis on winning at all costs than on enjoyment in taking part. The stereotype of the "manly" role, to which boys are expected to conform, can be particularly damaging, resulting in displays of domination and aggression, an inability to express the gentler sides of their natures, and a confrontational attitude towards relating to others.'(p.194)

The critique of gender bias in social sciences curriculum in New Zealand reflected similar critiques in the United Kingdom, Europe, Australia and the United States. Noddings (1992) argued that gender bias has artificially limited the scope of the social studies curriculum in the United States. She contends that social studies focuses on the public, political and competitive aspects of social life, while ignoring private life, and values that promote caring and peace studies.

While most of the New Zealand critique of gender bias in curriculum has been focused on social studies, Nairn (1995) claimed that 'male focused lessons predominate in the current secondary
geography curriculum’ (p.28). She cited as an example, the fifth form Prescribed Common Topic: Resources and their Use, which generally focuses on men’s activities in farming and mining. Australian researcher, Janice Monk (1997) writing in the New Zealand Journal of Geography, reported that an Australian review found that ‘information on the lives of girls and women is generally omitted in geographic education materials’ (p.8).

Longhurst and Peace (1993) commented that geographers are particularly well equipped to expose the androcentric nature of content, method and approach in geography and geography curriculum. They argue that the change of usage in the secondary draft syllabus document developed in the late 80s from the male generic 'man and his environment' to 'people and their environment' brought about 'sanitation' but not gender inclusiveness:

'A after nearly a decade of working with the concept of non-sexist practice it is now being recognized that hegemonic representations of the world, on which geography is based, remain, in many respects, unchallenged (see Lather, 1991). The term 'people' may be more inclusive than the term 'man', but the inclusiveness is at the cost of any differentiation. Careful sanitisation of the language has not altered the fact that the 'people' who are invariably the focus of geography are still implicitly male. Schools now have a 'non-sexist' geography curriculum document from which factors such as gender, race, ethnicity, age and class have disappeared.' (p.8)

Shaw (1989) described the significance of the development in 1987 of a new topic for the National History Syllabus at 5th form level: 'The impact of women on New Zealand Society: Health 1915-1985'. She argued that once educators started doing the research and development associated with including women as a focus in curriculum, it became apparent that:

'there has been a resounding silence, interrupted with distorted add-ons, about women's past experiences and achievements.' (p.31)

Shaw (1989) identified four key factors that led to this curriculum development as having a substantial impact on educational practice. These were:

1) the impact on educators of uncovering historical material that had been absent from their own historical studies;

2) the impact on students of access to historical documents written by women (eg, the submissions of and responses to women to the 1937 MacMillan Committee of Enquiry on Abortion);

3) the efficacy of oral history as a tool for generating and critiquing historical information; and

4) the critical thinking abilities developed by students as they checked the absences and framing of historical material.

Shaw saw the curriculum development as a significant move beyond the presentation of women as victim or heroine. These developments, she argued, would enable the history curriculum to address more effectively the complexity of women's lives, experiences and perspectives within mainstream history curriculum.

In parallel with Shaw's (1989) claims about the disciplinary development in history, Longhurst and Peace (1993) proposed that feminist geography was creating a new geography: producing studies of women's spaces in homes, in cities, in workplaces, and in regions:
'Such studies are not just about making women visible in the established traditions, sub-areas and paradigms of the discipline - they require a total reconceptualisation of those traditions. It is not just about adding women in and stirring them round a bit. It is about a reconceptualisation of the discipline.' (p.6)

Singh (1990) emphasised the importance of such reconceptualisation of the curriculum in the Australian context. He warned against simplistic approaches to making curriculum inclusive and argued for a socially critical approach that goes beyond mere inclusion:

'Improvements may be made by permeating the mainstream curriculum with the perspectives and points of historical actors previously derided or consigned to silence. The "inclusive" curriculum is an example of this approach. However, the weaknesses of merely infusing the extant curriculum with a counter-hegemonic perspective inevitably become apparent. A syllabus which is racist will merely become more incoherent and contradictory with the addition of anti-racist perspectives. Williamson-Fien (1986) has made the same point in relation to the ineffectiveness of merely including "women's geography" units in existing sexist curricula.' (p.11)

Such major rethinking of the social science disciplines and curricula met with substantial resistance. UK researchers such as Digby (1994) and Huckle (1991) advanced their views that the British initiatives to develop more equitable curriculum and curricular content linked to the lives of students, were undermined and largely halted by the influence of New Right pressures on the national curriculum initiatives. The contestation of the Social Studies Curriculum drafts by the Business Round Table exemplified such pressures in the New Zealand context (Openshaw, 1998; Partington, 1997; 1998). Initiatives to make the curriculum more inclusive drew ascerbic comment about 'assaults on the traditional curriculum' by Scruton (1997) in a document funded by the Business Round Table, and commissioned by the Education Forum:

'The boundary between education and indoctrination has been dissolved, and educational 'theory' has become an excuse for political attitudinising. The process is fuelled by the presence in New Zealand of another and (by local standards) older civilization with which to castigate the civilisation of 'Dead White European Males'. Feminism, gay liberation, and assaults on the traditional curriculum go hand in hand with an emphasis on the Māori as the true natives of New Zealand.' (xi)

Relatively little research or writing was located for this review that directly and substantially addressed issues of masculinity, and the ways in which men are positioned in the social sciences curriculum, in either primary or secondary schooling in New Zealand.

The mixture of professional excitement, angry debate and uncertainty evident in commentary on the policy of gender inclusiveness in the New Zealand social sciences curriculum raised challenging issues for teachers charged with implementing the gender-inclusive curriculum. Meyer (1998), identifying historical shifts in public perspectives on issues central to social studies such as 'ethnic cleansing', posed a central question:

'Conceivably, the new millennium may bring a new interpretation to...many other events throughout the world...how then are we to teach social studies in the face of all this confusion - if not downright deception, denial and overwhelming evidence of one bias or another?' (p.ii)
With deference to the work on 'transformative curriculum' by Professor James Banks, Meyer (1998) proposed that the nature of social studies requires that educators should develop critical thinking skills in young people. Benson (1998) emphasised the uncertainty faced by teachers. She pointed out that although the 1997 Social Studies Curriculum Statement directs and requires schools and teachers to implement a gender inclusive programme: “neither the Curriculum Framework nor the Social Studies Curriculum suggest how gender inclusion in schools will be achieved” (p.196).

**SUMMARY OF CURRICULUM**

Prior to the introduction of the Social Studies Curriculum statement, this subject was seen to be markedly male-biased in its language and content. Such bias was not seen to be good or appropriately educational for boys or girls. Social studies had been seen to focus on the public, political, military and competitive rather than the private, and community values and caring.

Secondary geography and history curricula have been seen to be androcentric (male focused), providing distorted representations of human history and activity.

The strategy of replacing male generic language in the social sciences with gender neutral language was seen to be “sanitising” the language, rather than increasing gender inclusiveness.

When New Zealand history teachers sought to create a more inclusive curriculum they were strongly affected by the discovery of material about women that had not been available to them as they did their own tertiary studies.

Educators have found the use of authentic historical documents about women's history to have a marked impact on students.

Oral history has provided a tool to assist educators in generating more balanced and inclusive historical texts.

Developing gender inclusive curriculum provided students with opportunities to develop critical thinking skills as they deconstructed the gender regimes structuring traditional knowledges.

The development of a gender-inclusive geography involved reconceptualisation of the discipline - not just an 'add women and stir' approach.

Both in Britain and New Zealand, the development of gender-inclusive curriculum met with substantial pressures from conservative sectors in the wider business community and society.

The inclusion of feminist, gay and Māori perspectives has been portrayed as an assault on traditional curriculum.

There is a vacuum in the research relating to masculinity and social sciences education in New Zealand.

Critical thinking skills are imperative to social studies, because it is in the nature of social studies to be contested as our social understandings develop.

The claim has been made that there is little available to support teachers in developing gender-inclusive curriculum in social studies.

**10.4 SOCIAL SCIENCES TEXTS**

In contrast with the extant New Zealand research on reading, mathematics and sciences texts there appears to have been less published research into gender bias in social studies texts and the other areas of the social sciences curriculum in New Zealand. In a review of United States research Hahn, Bernard-Powers, Hunter, Groves, MacGregor and Scott (1986) pointed out that 'the most extensively documented inequity in social studies is the under-representation and stereotyping of females in social studies textbooks' (p.280). These reviewers also cited multiple research studies carried out in the 1970s.
and 1980s, revealing that males dominated photographs, quotations, examples and case studies in history and economic texts (for example, Arlow & Froschel, 1976; Blankenship & Hahn, 1982; Macleod & Silverman, 1973; Weinbaum, 1979). Hahn, Bernard-Powers, Hunter, Groves, MacGregor and Scott (1986) noted that by the outset of the 1980s, many U.S. publishers had adopted guidelines to eliminate sexist bias from textbooks, but that many social studies texts continued to be biased.

Alton-Lee, Densem and Nuthall (1990) published coding sheets to assist New Zealand teachers to carry out analyses of gender bias in language and representations in texts, and to enable students themselves to analyse and reflect upon gendered patterns in school resources. Alton-Lee, Densem and Nuthall (1990) reported also that their analyses of gender bias in social studies showed that females were markedly less prevalent in the enacted curriculum experienced by children than in the resources available.

Wort (1995) carried out a comparison of the school journal stories used as social studies resources in New Zealand over four decades and found variations for journal level. Males featured more frequently as the focus of Part One Journal features before the 1990s. In 1993 females featured once more than males. The Part Two Journals showed a relatively equitable distribution of features by gender in 1963 and 1973 but showed marked gender bias in favour of males in 1983 and slight bias in favour of females in 1993. The Part Three Journals showed marked gender bias in favour of a male focus in 1963 (where females did not feature), and marked gender bias in 1973 (13 males to 3 females), and 1983 (10 males to 4 females), but less in 1993 (7 males to 5 females). The most pronounced gender bias was evident in the higher level Part Four Journals (37 males to 12 females overall) but Wort's (1995) analysis showed the extent of the bias steadily diminished over each decade. Table 1 below shows the pattern of generally diminishing bias over the four decades, with the most marked change evident in the 1993 journals.

**TABLE 10.1 GENDER ANALYSIS OF FOCUS CHARACTERS IN SCHOOL JOURNAL SOCIAL STUDIES RESOURCES**

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<td>Females</td>
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Wort (1995) concluded that a policy change occurred late in 1983 to 1993, to achieve relatively equitable gender balance in the focus characters in school journals. He also suggested that the gender bias in the journals for older children needed to be addressed.

Carkeek, Davies and Irwin (1994) analysed the language in 1,448 text references used in textbooks, written material and audio tapes in immersion, bilingual and mainstream classes in social studies. They found relatively equitable gender specified mentions, with Māori females, Tauiwi females and Māori males each comprising 13 percent of the examples; Tauiwi males accounted for slightly more mentions, at 18 percent. Their analyses of 1,353 images of people in text illustrations or visual resources showed 38 percent to be female, 55 percent to be male and 7 percent to be neutral. While male images and representations featured were slightly more prevalent than females and Tauiwi males, the findings for these settings do not show such marked gender bias as is evident in other New Zealand, or overseas studies. Carkeek, Davies and Irwin (1994) pointed out that the nature of resources used, especially those based in kaupapa Māori and taught through Te Reo Me Ona Tikanga, reflected tailor-made resources. These researchers commented upon the necessity for, and work involved in, teacher preparation of teaching resources for these settings:
There are so few resources in Māori produced for use in primary school classrooms that it is very difficult to achieve this 'balance': it is a hard fought victory. (p.208)

**SUMMARY OF RESEARCH ON SOCIAL SCIENCES TEXTS**

There has been little published research on gender bias in social studies texts. Overseas analyses suggest marked gender bias, featuring male experience, is prevalent.

Alton-Lee, Densem and Nuthall (1990) published coding sheets to assist New Zealand teachers in carrying out analyses of gender bias in texts, language and representations in texts.

Gender bias in school journals has markedly reduced over the past three decades.

School journals are, overall, gender-balanced in their featured characters. However, there is a trend for there to be more focus on males in the journals as the reading levels gets harder.

Through the generation of teacher-made resources for Māori social studies texts in some immersion and bilingual programmes, greater gender balance has been achieved than is characteristic in other areas of the education system.

**10.5 RESEARCH ON GENDER AND ENACTED SOCIAL SCIENCES CURRICULUM IN PRIMARY AND INTERMEDIATE SCHOOLS**

**10.5.1 Teacher-Pupil Interactions**

Kelly (1988), in her meta-analysis of studies of teacher-pupil interaction patterns, found boys to dominate class discussion more in social studies (almost 60% of interactions) than in any other curriculum area. This subject-related finding has received scant attention in the literature. Alton-Lee, Nuthall and Patrick's (1993) finding that Form 1 (Year 7) boys participated in 70 percent of the public interactions, during a class brainstorm in social studies in a New Zealand class, suggested the pattern of gender bias may have been even more marked in the New Zealand context at this class level. In that class, there were more boys than girls; so, during the social studies unit brainstorm, girls were participating publicly less than half as frequently on average as were boys. Alton-Lee and Nuthall (1991) also found more marked gender bias in boys' participation in social studies than science, although different samples of students were involved.

Smythe (1994) questioned the interpretation of the research findings on gender bias in classroom interaction:

'It is irritating for teachers to hear the repeated reference to the so-called significant research finding that boys dominate teachers' time and, in doing this, put girls at a learning disadvantage. There are situations, especially at secondary school, where this disadvantage does occur, but boys' domination of teachers' time should, instead, mainly be viewed as a learning disadvantage for boys... When teachers set up activities and ask the children to get going, there are usually a number of children who don't know what to do, many of these boys. So, while such children go to the teacher for help, the rest get on with their learning. The learning advantage lies with those getting on with their work, not with the others.' (p.11)

As was evident in the report on achievement early in this section of the review, the assumption of learning disadvantage for boys in social studies at primary level is not borne out by recent National Education Monitoring Project findings. Rather, boys are doing slightly better than girls in social studies at primary level, both at Years 4 and 8 (Flockton & Crooks, 1997).
However, Smythe's argument, that boys' domination of interactions with the teacher should be seen as a learning disadvantage, is partially consistent with Hughes' (1973) finding that active participation in class lessons was not directly correlated with achievement. Also, the relatively universal finding that boys receive more negative evaluations from teachers than girls suggests such attention is no advantage (Kelly, 1988). However, Nairn (1991), whose research is reviewed later in this chapter, points out that student public verbal participation enables teachers to diagnose students' current understandings, and enables students to gain confidence in participating in their communities — a central aim of social studies. Lee (1996) suggests that teachers are not sufficiently attending to issues of discipline, control and responsibility when they view boys as victims of their own domination.

The use of quantitative approaches and means in classroom interaction studies investigating gender has shown a near-universal trend of male predominance across subject areas and class levels. However, without qualitative analyses, such approaches have hidden the variability apparent, and the differential patterns for particular groups of girls and boys. Smythe (1994) claimed that the boys who dominate teacher interactions may be disadvantaged, but what is happening to the quiet boys? Town's (1998) research provides insight into what is happening for some quiet boys. His research suggests that for gay students, silence is one strategy to manage an identity for which there is no place in homophobic schooling — as is evident in William's explanation:

'I wouldn't ask the teachers questions and things like that ... it affected my learning process in that I wouldn't really get into my work ... being gay was the one priority on my mind um but just trying to hide and remain invisible out of the spotlight in the classroom ... my self-esteem was very low.'

(Town, 1998 p.170)

What is clear is that there are a number of issues arising out of the continuing pattern in the literature about gender bias in teacher-pupil interactions; and each needs to be addressed in more depth. For example: the functions of public interactions, the role such interactions play in student learning, the impact of individual students' predominance of such interactions on other students and themselves, the consequences for student confidence to participate publicly, gendered patterns in the functions of talk and writing in classrooms, issues of safety, and issues of classroom management for democratic participation. Jones' (1991) research provides a significant example of the value of qualitative analyses of the nature and function of Pacific girls' interactions with their teachers (elaborated elsewhere in this review). Given the aims of social studies, issues of public participation are intrinsically significant in this curriculum area and merit research.

Alton-Lee, Nuthall and Patrick (1993; 1999) reported an in-depth analysis of the covert and public participation, in a brainstorm in social studies, of two form one girls (one high achiever and one low achiever), and two form one boys (also one high achiever and one low achiever). Through the triangulation of observer records with audio data, gathered using broadcast microphones worn by the students, these researchers were able to explore the students' public participation in the light of their other behaviour. For example, peer talk and self-talk. Although the students had on/off switches available to them no student chose to turn their microphones off during the introductory brainstorm selected for study. These researchers found that:

'Irrespective of achievement level, the case study boys were more easily able to participate publicly, were more likely to be praised, and more likely to take the risk of offering answers of which they were uncertain. The girls were careful to keep answers they were unsure of covert. Mia's strategy of remaining comparatively silent contrasted with Ann's strategy of managing much of the lesson through hidden supportive interactions with her friend Julia.' (p.310)
Ann’s public responses were consistently correct or appropriate, but her eleven wrong answers were kept covert as she talked to herself or shared her ideas with her peer. Interestingly, Ann did try to participate far more publicly, but her hand-raises and Mia’s hand-raises, were much less likely to elicit a teacher nomination than were the hand-raises of the boys, Joe and Jon. Ann appeared frustrated by her difficulty in eliciting a teacher nomination and called out her answers on five occasions, or turned to Julia and covertly shared her responses - at a rate of two to three utterances per minute, after her lack of success in publicly participating.

Despite the compelling record of Ann’s frustrated attempts to participate publicly, until he had access to the analysis, the teacher perceived Ann’s behaviour to be passive. Ann’s management of her contravention of the rules of order in the classroom through her private talk was ‘so effective that even when the teacher reviewed the video (long after the unit), Ann’s private utterances were hidden, and he commented that “Ann doesn’t offer as much as the others in terms of an active type of learning … She learns just sitting and soaking it up …”.(p.305). After exploring the evidence, these researchers and the teacher concluded that the attribution of the cause of the apparent differences in participation to a passive learning style was not justified by the audio microphone data. Rather, such ‘differences’ reflected the gendered lens of the teacher’s perceptions, the gendered construction of curriculum enactment, and gendered influences on student management of their participation.

Alton-Lee, Nuthall and Patrick (1993) also identified patterns in the boys’ greater public participation that negatively and directly influenced girls’ participation. One example they gave involved high status student Sarah, who was the girl who participated most frequently of any girl in the class brainstorm. During the brainstorming session, when Sarah gave the response ‘break dancing’ to the question ‘What does New York make you think of?’, Joe called out, labelling her publicly ‘New Zealand Knickers!’ This made her the focus of sexual innuendo, and silenced her. Sarah stopped participating after his remark.

The teacher and co-author of this article, John Patrick, explained that, while the long-term outcomes of the research had been positive for his teaching, the data had a ‘devastating’ effect on him:

‘I would’ve said “Yes, you know, I’m fully aware of the race issue or the gender issue, whatever ... It comes as a real blow to find out in actual fact you’re not necessarily doing things that are in line with what you believe ... the outcomes ... are extremely positive because they’ve increased my level of awareness. They’ve altered my action.’ (p.317)

Carkeek, Davies and Irwin (1994) focused both upon curriculum texts and classroom interaction patterns amongst a range of other areas of focus. Their study is one of the most substantial New Zealand studies of gender in social studies. This research was initiated by the Girls and Women Section Policy Division of the Ministry of Education in the early 1990s. The project was a response to: ‘the need for school-based research that looked at the complexity of interactions between suggested factors related to Māori under-achievement … methodology, classroom approaches, styles and practices’ (p.1). The study was situated in a comparison between the experiences of children from new entrants through to standard four level in bilingual, Māori immersion and mainstream classrooms. Most of the students observed were at the junior school level. While the study was focused on the experiences of Māori girls, the use of comparisons between Māori girls and Māori boys and inter-ethnic group comparisons in this research provides some of the only research available that specifically identifies the experiences of Māori boys in New Zealand education over this decade.

Carkeek, Davies and Irwin (1994) reported their analysis of more than 1500 observed public teacher-child interactions, recorded over 24 talk sessions in seven focus classes. They found different patterns of pupil-teacher interaction by programme type. In the immersion classes, students initiated more of
the public interactions, teacher-pupil interactions were frequent, and Māori boys and Māori girls received, on average, equal amounts of interactions overall. Māori girls received slightly more positive evaluations (3.4 positive evaluations over the observation period) in the course of their interactions with the teacher than Māori boys (3.1 positive evaluations), but these overall patterns hid markedly different patterns for girls and boys in particular classes. In one immersion class, Māori girls received lower than average positive evaluations, while in another they received higher than average positive evaluations, suggesting a likely teacher effect.

Māori boys, however, received substantially more negative evaluations than Māori girls in immersion classes (Carkeek, Davies & Irwin, 1994). In these classes, Māori boys also initiated fewer interactions with the teacher, raised their hands much less and called out less frequently than Māori girls. In immersion programmes, Māori boys took on relatively fewer special duties than Māori girls.

These findings are important because, apart from the relatively universal finding in the literature that boys receive more negative evaluations than girls from their teachers, international research findings present a different overall pattern than was found in these immersion classes. These findings suggest both that the immersion classes enabled Māori girls ways of participating that are likely not to be available to them in mainstream classes, and that in these contexts, Māori boys were less forthcoming in their formal and informal participation in public positive interactions with their teachers than Māori girls. Clearly, gender was a strong influence on participatory behaviour for these Māori students.

The findings for the bilingual classes were much more congruent with the international findings on gendered patterns in classroom interaction, where strong gender bias was evident. The teachers initiated twice as many interactions with boys as girls. Boys were more frequently evaluated positively, and girls were less frequently evaluated positively. The few tauiwi boys in these bilingual classes raised their hands more frequently, for their numbers, than either Māori girls or Māori boys, called out more, initiated more interactions with the teacher and took on more special duties.

Gendered patterns of interaction were also marked in mainstream classes. Māori boys dominated call outs and received high rates of negative teacher evaluations. Teachers initiated slightly more interactions with Māori boys than any other group. These were predominantly negative in nature.

While gendered patterns were evident across programmes, variations were substantial both within, and more markedly between, programmes. Māori boys were least likely to be the recipient of positive evaluations in mainstream classes. On average, each Māori boy in the immersion classes received 3.1 positive evaluations, each Māori boy in the bilingual classes received 2.1 positive evaluations and each Māori boy in the mainstream classes received 1.7 positive evaluations. Māori girls received fewer positive evaluations than Māori boys in both mainstream and bilingual, but received most positive evaluations per student in the immersion classes. The qualitative analyses revealed that Māori children, and Māori boys in particular, were much more likely to present themselves to the teacher, seeking praise in bilingual and immersion programmes, than they were in mainstream programmes.

Carkeek, Davies and Irwin (1994) found qualitative differences in the behaviour of boys and girls across programme types in their observational data:

‘... girls were observed to stand back and “wait” for their teacher’s attention. Boys, by comparison, employed direct and persistent strategies to capture their teacher’s attention. Boys were observed more often than girls engaging in off-task or disruptive behaviour which attracted their teacher’s attention. Boys persisted in aggressive behaviour (sometimes directed at girls) which ranged from teasing and verbal aggression through to acts of aggression and harassment.’ (p.175)
Elsewhere in the review we have considered, in depth, gendered patterns in student behaviour. Here, we consider briefly the issue of teacher management of aggressive student behaviour in Carkeek, Davies and Irwin’s (1994) study. Although teachers in bilingual classes sometimes spoke to boys sternly about aggressive behaviour or asked them to apologise, the researchers found few instances of interventions, and noted that frequently, teachers did not reprimand or intervene with students who engaged in aggressive behaviour. This finding was illustrated through an excerpt from field notes:

‘3 Māori boys punching/kicking each other on the whariki ... 1 gets hurt cries to the teacher. Teacher gives him a hug and looks at his eye. Harley comes back with her. 3 Māori boys pretending to do work to avoid being told off.’

(Bilingual A, 29/4/92, p.180)

Teachers in mainstream and immersion classes were observed to be less tolerant of aggressive behaviour. The intervention strategies observed in these classes were geographic relocation (‘standing in the corner’), talking sternly, or requiring an apology. Such strategies of themselves have not been reported to be effective in the international literature.

### SUMMARY OF RESEARCH ON TEACHER-PUPIL INTERACTIONS IN PRIMARY AND INTERMEDIATE SOCIAL STUDIES

Patterns of male domination of public teacher-pupil interaction are more marked for social studies than any other curriculum area. Variations in these patterns do occur.

Researchers have claimed that teachers are not attending sufficiently to matters of discipline, control and responsibility for boys.

Student public participation allows the teacher to diagnose students’ current understandings, and public discussion is linked to the experiences of those who participate more.

Some gay students avoid any public participation in class, in order to remain out of the public spotlight.

Girls are less likely to take risks than boys in offering responses of which they are uncertain.

Girls’ hand-raises have been found to be less likely than boys’ hand-raises, to elicit teacher attention.

Teacher perceptions of student behaviour reveal gendered assumptions influencing teacher judgements of girls’ behaviour.

Given the nature of social studies, more qualitative rather than quantitative research is need to explain gendered patterns of participation, and to understand the behaviours of both quiet students and dominant students, in interaction with their teachers.

Māori immersion classes in social studies have been found to be more equitable than in mainstream contexts. Students initiated more of the public interactions, teacher-pupil interactions were frequent and Māori boys and girls received equal amounts of interaction overall.

A teacher effect between immersion classes produced marked variability.

Māori boys received more negative evaluations than Māori girls.
Summary of Research on Teacher-Pupil Interactions in Primary and Intermediate Social Studies (continued)

By contrast with immersion classes, strong gender bias was evident in teacher pupil interactions in bilingual classes and mainstream classes. Teachers in bilingual classes initiated twice as many interactions with Māori boys as with Māori girls.

Māori boys and girls received the most positive evaluations in immersion classes, fewer in bilingual classes and fewest in mainstream classes.

Carkeek, Davies and Irwin (1994) found qualitative gender differences in behaviour across programme types. Girls waited more and were less disruptive. Boys persisted in verbally and physically aggressive behaviour.

Teachers in bilingual classes were frequently observed not to intervene with students (mainly boys) engaged in aggressive behaviour.

Teachers in mainstream and immersion classes were less tolerant of aggressive behaviour.

10.6 ENACTED CURRICULUM IN PRIMARY AND INTERMEDIATE CLASSES IN SOCIAL STUDIES

Alton-Lee and Nuthall (1991) reported analyses of gendered patterns in curriculum in two social studies units. ‘The English Middle Ages’ unit was studied by a standard three class, and a unit entitled ‘New York City: A study of cultural differences’ was studied by a Form 1 class. Both units were taught before the advent of the new national curriculum. The research design involved audio and video recording of the participation and experiences of three to four students over each quarter minute period of a unit of work. Pre and post testing, long-term testing and in-depth interviews were carried out to investigate student learning outcomes. The units were part of the ongoing regular school curriculum, and the gender analyses were carried out retrospectively to investigate the influence of gender in curriculum, participation and student learning.

Analyses of the curriculum that the students’ experienced (teacher talk, teacher-student interactions, visual resources, texts used and so on) revealed that fewer than 4 percent of the thousands of mentions of people in the Middle Ages unit were female (Alton-Lee & Nuthall, 1991). Qualitative analyses of the nature of the mentions of women and girls in this unit revealed that these relatively few mentions of females were likely to be pejorative, derogatory and/or apparent cause for a humorous or belittling remark.

Interviews with all three case study students revealed patterns, in the students’ understandings of the people they had studied, that reflected the gender bias in the curriculum. For example, after Sam overcame his understandable initial difficulty in explaining to Graham Nuthall what women did in the Middle Ages he explained: ‘Walk up and down the castle trying to act beautiful … and people used to go ‘Wow, you’re so beautiful!’ Amy explained that the curriculum focused more on men because ‘the women were not barons or knights or anything’. In one of his interviews, Kim explained: ‘I’ve forgotten completely what a nunnery is … Oh, I think its something to do with a monastery’. The children were unaware of the nature of women’s activities during the Middle Ages, were dismissive of medieval women and reverted to talking about men when asked about women.

Alton-Lee and Nuthall’s (1991) analysis of gendered patterns in the ‘New York’ unit revealed the gender bias to be even more marked than that in the Middle Ages study, as women comprised only 2.4 percent of the mentions of people in this unit. The first mention of a woman was a reference to prostitution as an occupation of people in New York city offered by a student in a brainstorm. High achieving female case study student, Mia, revealed that she identified with men rather than women in curriculum when she referred to ‘people like us … they wore clothes like us’.
Interviewer: When you say ‘us’ do you think of women or men?

Mia: I think of men really, ‘cause sort of early Canterbury you have visions of people wearing sort of long suits and things. You know, I don’t really ... That’s right. I only think of the men. I don’t think of the women.’

In both these units, students experienced or participated in curriculum wherein there were 15 to 21 mentions of males for every one mention of a female. The researchers found that there was so little curriculum content about women that students were unable to interact with new information, to enable long-term learning to occur (Nuthall & Alton-Lee, 1993).

Consequently, the students ‘learned’ to attribute the little they did learn of women’s accomplishments to men. For example, although the children were taught that Joan of Arc fought the battle that ended the Hundred Years War in France, most of the class ‘learned’ that William the Conqueror, who was frequently mentioned during the unit, had accomplished this feat. Six children who had actually accurately selected or guessed Joan of Arc in their pre-test responses ‘learned’ that it was William the Conqueror by the end of the unit. When this phenomenon, whereby students ‘learned’ to attribute women’s accomplishments to men, recurred in a later Understanding Learning and Teaching Project study at Canterbury, the researchers coined the term ‘William of Arc effect’, to refer to this curricular process (Alton-Lee, McBride, Greenslade & Nuthall, 1997). The patterned undervaluing of women deeply influences the knowledge students gain.

These findings are consistent with an overall pattern of invisibility and subordination of women in children's thinking, identified in a recent US study (Fournier & Wineburg, 1997). These researchers asked 73 fifth and eighth graders to draw and describe people(s) in history such as Pilgrims, Western settlers and Hippies. However, whereas in the Alton-Lee and Nuthall (1991) findings, both girls and boys appeared to omit instances and images of women from their interviews and work, the U.S. researchers found a differential gender effect. In Fournier and Wineburg's (1997) sample, 84 percent of the boys drew male figures while the girls tended to draw equal numbers of females and males. The girls also frequently opted to draw families or groups where women accompanied men, rather than following the researchers' direction to draw single figures. Fournier and Wineburg's (1997) concluded that, for their Washington State sample of children:

In girls' minds women in history are blurry figures; in boys' minds they are virtually invisible.' (p.182)

Although Alton-Lee and Nuthall (1991) found that both pakeha boys and pakeha girls identified with the white men in curriculum who were portrayed as brave, civilized, pioneering and intrepid, this finding was only evident in the data of pakeha students. Ricky, a Mäori boy interviewed in this study, did not identify with the heroic white men in curriculum, and repeatedly referred to Englishmen as ‘they’, not ‘us’. Mäori boys experienced racist abuse during social studies, even in programmes designed to counter racism (Alton-Lee, Nuthall & Patrick, 1993).

Alton-Lee and Nuthall (1991) concluded that that their findings ‘raise serious questions about the current consequences for our society of an educational process that leads both girls and boys to undervalue and denigrate girls and women’ (p.73). Alton-Lee and Densem (1992) suggested that these hidden processes of gender bias in curriculum could underpin and support boys’ abusive behaviour towards girls and girls’ collusion in such denigration. Alton-Lee and Densem (1992) argued also that, although girls may be doing well, on average, compared with boys, there is a question about what they are achieving: ‘A male heritage? A perspective wherein the absence of women is usual? A derisory attitude towards women as ‘other’? … an education that undervalues their gender?’ (p.209) Alton-Lee
Explain and Addressing Gender Differences

(1993) argued that when girls do achieve, by constructing out of curriculum an understanding of women as other, less valued and marginal, then they are experiencing a kind of 'alienating achievement' — a heritage that undermines their own worth and identity as female (Sturrock, 1993).

Now the recent National Education Monitoring Project findings for social studies reveal a gendered pattern of achievement that favours males in social studies. It seems the masculinist bias in traditional social studies and social science teaching in schools may actually undermine girls' achievement.

### SUMMARY OF RESEARCH ON GENDER AND CURRICULUM ENACTMENT IN SOCIAL STUDIES

Research in enacted curriculum in social studies before the new national curriculum has shown females to be fewer than 4 percent of the mentions or depictions of people in curriculum (Alton-Lee & Nuthall, 1991).

The relatively few mentions of women were likely to be pejorative, derogatory, and/or cause for a humorous or belittling remark.

Students' thinking about what they learned was structured by gender-bias in curriculum.

Studies revealed that Pakeha girls identified with male experience in curriculum in social studies. Māori boys did not identify with white male experience, and were positioned as 'other' within the enacted curriculum.

Findings across studies revealed Māori boys experienced racist abuse during social studies, even in programmes designed to counter racism.

There were so few mentions of women in social studies curriculum that students did not get sufficient opportunities to process this new information in order to remember what they learnt. Rather the 'William of Arc' effect occurred, where students 'learned' to attribute what they learned of women's accomplishments to men. This effect has recurred across studies in social studies curriculum.

Alton-Lee and Nuthall (1991) concluded that their findings 'raise serious questions about the current consequences for our society of an educational process that leads both girls and boys to undervalue and denigrate girls and women'.

When curriculum denigrates women, what are girls achieving in social studies: 'A male heritage? A perspective wherein the absence of women is usual? A derisory attitude towards women as 'other'?

Hidden processes of gender bias in social studies curriculum could underpin and support boys' abusive behaviour towards girls, and girls' collusion in such denigration.

Findings of gendered structures in social studies curriculum that are influencing student thinking have been evident also in recent US research.

The masculinist bias in primary social studies may support/relate to girls' slightly lower achievement in this subject.

The evidence of marked gender bias in New Zealand social studies curriculum and its effects led Alton-Lee and Densem (1992) to develop a framework identifying six stages in the process of curriculum change.

1) Preliminary strategies: Observing and investigating the gendered construction of experience

2) Deconstructing gendered curriculum.

3) Changing curriculum resources.
In the subsequent discussion, examples of relevant research are used to illustrate the implications of these stages for educational practice.

(1) Preliminary strategies

Alton-Lee and Densem (1992) proposed that, because learners actively construct their own gendered world using the social categories and meanings available, strategies for change should begin with ‘processes that make us aware of the gendered nature of our experience’ (p.210). They called for the use of action research to enable educators critically to evaluate gendered processes in their own contexts:

‘There is a need for those involved in pre-service and in-service education of teachers at colleges of education, universities and schools to model and provide training in action research methods and other approaches to facilitate reflexive (self-evaluative) practice.’ (p.211)

Alton-Lee and Densem (1992) suggested simple strategies to get pre-service teachers to systematically analyse the visibility and positioning of females and males in curriculum texts. However, they cautioned that, unless students were presented with alternative material about the women that could have been included in androcentric texts, students themselves may simply regard the absence of women in social studies or history texts as ‘normal’ and appropriate.

In this first stage, Alton-Lee and Densem (1992) suggested also that educators should be aware of the psychological research on the impact of language on students. For example, Henley’s (1989) review of research, revealing that male generic language, such as the use of ‘mankind’ or ‘he’, to mean people in general, was perceived by children to reference only males. Henley concluded from her review of research that, when teachers specify both genders (he and she), students are most likely to reference both males and females.

(2) Deconstructing gendered curriculum

In the second stage of curriculum change, Alton-Lee and Densem (1992) called for teachers to deconstruct the gendered nature of curriculum, to enable both girls and boys to be less restricted in their learning. For example, they cited the action research of teachers Rachel Martin and Jane Malham, who changed their junior school developmental programme to ensure that activities, such as building and tea parties, that have been traditionally gender stereotyped, were confounded. These teacher researchers paired and confounded traditionally feminine and masculine activities, so that students could elect, for example, to build tables for tea parties, dress up in rockets and make dolls’ houses with blocks. Alton-Lee and Densem (1992) argued that such strategies were not addressing the issue of stereotyping in a trivial manner, or inappropriately requiring students to challenge a gendered world. Rather, their approach to curriculum helped to deconstruct the male/female dualisms Bronwyn Davies argued to be fundamental to the construction of gender-bound identities (Davies, 1989).

(3) Changing curriculum resources

The third stage of curriculum change in the Alton-Lee and Densem (1992) framework involved attention to the provision of curriculum resources that are inclusive of diversity. In particular, they argued for use of a range of diverse examples and images of women.
Towards inclusive curriculum

Alton-Lee and Densem (1992) suggested that, once these initial three stages had been addressed, educators should engage in the development of inclusive curriculum, using sound developmental and pedagogical principles, based on the prior understandings and schemata of learners. They critiqued Schuster and Van Dyne’s (1984) stages of curriculum change, which had focused students’ attention on the absence of women, before providing them with examples of women in history.

Alton-Lee and Densem (1992) argued that students need first to encounter examples of diverse women in curriculum — then to develop the critical skills that such examples would support. They suggested this approach because their research revealed that not only was the absence of women not noted, but also, children had developed schematic responses, and for children, the derogation and marginalisation of women was perceived as normal. Any focus on ‘women as a disadvantaged group’ these researchers argued, would simply confirm and validate these schematic responses. Teachers should rather present strong and diverse representations of women in curriculum, to challenge such schematic thinking. The pedagogical principle that new curricular content should be linked to the children’s own experiences was emphasised. Alton-Lee and Densem (1992) provided the example of male case study student, Kim’s, positive learning about medieval women, when he linked the work of medieval women to his experience of the spinning wheel that belonged to his stepmother, whom he greatly admired.

McMenamin (1988) and Vincent (1992) drew upon the framework to develop gender inclusive curriculum through an initial focus on women. Using just such an approach, McMenamin (1988) introduced the topic of mothers into a junior class social studies programme. McMenamin (1988) aimed to support students in valuing their mothers, and the work done by their mothers. She found that students were resistant to the notion of valuing their mothers’ work as work when it was home-based. McMenamin (1988) entitled her research ‘She does nothing, she’s just a normal mother’, highlighting the challenges for teachers in valuing women within curriculum.

Vincent (1992) used the principle of beginning from the students’ own experiences when she developed a women-focused unit on the topic ‘The role of women in World War II’. Vincent planned to use the experiences and resources of the 37 students in her composite standard three and four class. Partly because of the difficulty she had finding material about women for this topic, she brought a guest speaker into the classroom. Kerry Vincent modelled for the children an approach to interviewing an informant, which they in turn, were required to use in interviewing their grandmothers, or other older informants in the community, who had experienced World War 2.

Vincent aimed to ‘provide an opportunity for the children to see, and discuss, the shortage of information on women, and to overcome this by engaging in some authentic research of their own’ (p.4). Through this strategy, Vincent developed a class resource composed of the written reports of the experiences of Pakeha, Māori, Samoan, British, Japanese, Russian and German grandmothers. Not only did she enable the children to have access to meaningful information wherein the experiences of women were valued, but also the children gained multiple and diverse perspectives on war. Such an approach implicitly but deeply challenged the traditional positionings of ‘us’ and ‘them’ in curriculum. This approach to curriculum also is inclusive of diversity, by using the diversity of the children as a resource to enhance social studies curriculum. Such an approach enabled students to value the older women within their families and communities.

The students provided 157 pre-test responses about women’s roles, chiefly focused on first-aid, caring for children and cooking. Their 328 post-unit responses covered a broader range of activities including smuggling, spying, welding, dispatch driving and servicing anti-aircraft guns. In evaluating the curriculum intervention, Vincent (1992) commented upon the dangers of undervaluing women’s
traditional work. She commented on the challenge to her intervention created by grandmothers themselves, when they downplayed the value of traditional women's work in their interviews with their grandsons and grand-daughters.

(5) Challenging the 'hidden curriculum'

The power of an intervention focused on curriculum is well illustrated by Vincent’s (1992) study. In the fifth stage of their framework for curriculum change Alton-Lee and Densem (1992) argue that attention to curriculum is central to effective intervention. They argue that curriculum plays a hidden role in sustaining other gendered practices in the use of space, time and teacher attention in schools. In considering the prevalence of boys’ greater participation in classroom discussion, Alton-Lee and Densem (1992) asked: ‘Why should girls actively participate in a curriculum that largely excludes or undervalues their experiences? (p.218). They cite evidence from an action research study by junior school teacher researchers Joy McLeod and Francelle Todd (1988), who found that girls participated more frequently in class discussion about a story when the main character of the story was female.

(6) Reflexivity in theory and practice

The final stage of curriculum change in Alton-Lee and Densem’s (1992) framework called for reflexivity in theory and practice, with attention to empirical evidence. They argued that constant reflexivity and evaluation is vital ‘because whatever we believe to be the function of a particular strategy, its real impact on children in a particular context may be quite different from what we expect (p.219).’

Alton-Lee and Densem (1992) pointed out that the reports of effective action research programmes addressing gendered processes in schooling in the British, Australian and U.S literature frequently assumed, but did not make explicit, the substantial resourcing of facilitation, support and training for teachers from university courses, or large funded research projects (for example: Tutchell,1990; Burchell & Millman, 1989; Deem & Weiner, 1990).

Alton-Lee, McBride, Greenslade and Nuthall (1997) reported a study of the ways in which a teacher implemented gender-inclusive curriculum. They evaluated the influence of the curriculum intervention on both girls and boys in an intermediate school. The context of this study was a whole school professional development programme in gender equity.

An evaluation of the programme across the school, using the Coopersmith self-esteem inventory as one outcome index, showed that boys' self esteem scores were higher on average than girls’, before part of the school-wide programme. However, both girls' and boys' self-esteem rose on average after the intervention. Girls' self-esteem rose slightly more to reach the same level as boys' self-esteem. This finding was important in showing that focusing on gender equity can be positive for the well-being of both boys and girls. The programme also involved parents in an information evening about the gender equity programme. An evaluation of parents' responses showed a strong positive response to the programme across the parent community.

In the course of the gender equity programme, a gender analysis of the school's teaching resources across subject areas was carried out, revealing particularly marked gender bias in the recently planned social studies units. A resource set of 614 illustrations of harsh environments revealed that only 5.6 percent of these resources depicted females, and the positioning of women in those instances were peripheral to the male subjects of the resources. For example, an illustration showing men at the Antarctic viewing images of geishas on slides. Observations of classroom interaction patterns showed that, apart from one exceptional lesson, boys were taking up 60 percent or more of the public classroom interactions on average.
Teachers, Tania McBride and Mike Greenslade decided to collaborate to redevelop the units on harsh environments, using an action research approach; and to participate in Understanding Learning and Teaching Project studies, to enable the impact of the gender inclusive curriculum to be evaluated. These teachers and researchers found that in both classes, although boys dominated the classroom talk at the outset of the units in both classes, as the information about women was included in the units, girls participated more frequently. By the end of the unit, in Mike Greenslade's class, the overall average participation of boys and girls was the same. By the end of the unit, in Tania McBride's class, there was less than half a turn difference between girls and boys, with girls participating slightly more frequently than boys. No other participation strategy was used by the teachers to address the gender bias in classroom interaction - only the strategy of including women in the curriculum resources. Yet, this curriculum strategy was more successful than non-curricular strategies designed to explicitly influence public participation (Kelly, 1988).

The full report provides an in-depth evaluation of student learning and experiences of curriculum, in Tania McBride's unit 'Workers in Antarctica' in a Form 1 class. In her own report to the Ministry of Education on this project McBride (1993), explains that her aim was 'to achieve equitable outcomes for students of both sexes'. She worked with research assistant Anthea Clibborn Brown to generate gender balanced resources, but found that the resources available were male focused. For example, the national film unit videos used male generic language throughout:

'Every year hundreds of scientists and tons of supplies and equipment arrive in Antarctica from around the world. Why is there this huge investment in men and materials in the bleak continent at the bottom of the world?'

To balance such marked male focus both teachers drew upon alternative resources. For example, they invited geologist and experienced mountaineer Margaret Clark, who had led a transantarctic expedition, and student Rachel Hamlin, who had spent a summer on the ice working on the restoration of Shackleton's Hut, to share their experiences with the students. The inclusion of women in the curriculum was not highlighted to the students as a 'special' mention. Rather, the strategy was to make the use of women implicit, and focus on the social studies aims - human adaptation to a harsh environment.

These teachers wished to avoid the message, implicit in the previous unit resources, that the essential attribute for participation in Antarctica was male gender. Two central questions taken up in the research were:

'Did the use of an implicit woman-focus lead the girls to see survival and work in the challenging Antarctic environment as a possibility for themselves? If the woman-focus did open up the possibilities for girls, did it also open up or did it constrain possibilities for boys? ’ (p.20)

In this study, the term 'discourse' was used in the analysis of enacted curriculum, not in the linguistic sense to mean just text, but to denote how language (and other representational practices in enacted curriculum), position subjects and constitute reality from particular perspectives. Four distinct discourses in the resources and the enacted curriculum were identified: (1) male-only implicit, (2) male norm/female exception, (3) 'ungendered' and (4) multiple positionings (embodied).

The male-only implicit discourse, evident in the videos, and the predominance of the heroic stories of Scott, Ross, Shackleton and Amundsen as 'the Antarctic stories' (irrespective of topic focus), was found to be problematic for both girls and boys. In the male-only implicit discourse, women are absent because of their gender. On occasion, as in the example given with the geisha slides, women were portrayed as the (absent) focus of the male gaze. However, the male-only implicit discourse gives emphasis to particular heroic portrayals of masculinity in the discourse. For example: brave, rugged,
macho, competitive, hard working, and dead. These positionings present boys with limited and somewhat problematic positionings as males.

With respect to the issue of survival in the harsh Antarctic environment, the male-only implicit discourse not only excludes women, but also places weight on particular qualities associated with maleness, rather than on the skills, knowledges and abilities necessary for survival. In spite of the gender inclusive nature of the unit, the male-only and male-norm discourses were influential in the learning outcomes of the case study students, who remembered more men than women after the unit.

The implicit male norm/female exception discourse was identified as 'Such a harsh climate is a male preserve: Women who have gone there are the exception, because women by virtue of their gender would not normally go'. Alton-Lee, McBride, Greenslade and Nuthall (1997) pointed out that, from an historical perspective, there is some validity to the argument of exceptionality. However, the schematic power of the discourse was so extreme in the instructional resources that the schema of exceptionality created the 'first-woman myths', in which text after text told of the 'first woman' to go to, winter over or whatever in Antarctica. The problem was the women who featured in such claims were frequently different women. For example: Jeanne Baret, Edith Ronne and Jennie Darlington, Louise Holliday, Christine Muller-Schwarzer and Irene Peden.

The main strategies used to disrupt the male-only implicit discourse was the use of an implicit women focus:

'\textit{The use of a woman-focus without an explicit communication to students about her gender disrupts both male-only and male norm /female exception discourses, because the gender is implicit. That is, no statement of exception is made. Rather, the taken-for-grantedness, the given of her presence as an instance, is the message.}' (p.24)

Further, the individual identities, and likes and dislikes and capabilities, of the women were evident in the programme, so that their positionings reflected the complexity of life, rather than being stereotypical portrayals. This approach to deconstructing unitary identity is highlighted by Britzman:

Britzman (1995) warned against proliferation within curriculum content as a strategy to manage issues of equity and diversity in curriculum:

'\textit{In this way, the problem of curriculum becomes one of proliferating identifications, not closing them down more is required than simply a plea to add marginalised voices to an already populated site.}' (p.158)

The implicit woman-focus influenced the learning of both female and male students. All remembered Rachel Hamlin and Margaret Clark, although case study student Jim's memories were of Ross and his uncle — and then 'there was those two ladies that came in …' (p.26).

The students' post-unit knowledge was integrally linked to women's experiences. For example, both male and female case study students mentioned Rachel Hamlin when they described snowbridges and discussed crevasses.

The data from the broadcast microphones and student records in this study revealed that the impact of the people resources on both boys and girls was dramatic: 'You're coming with me to Antarctica man!'. One female student, Masako, planned to go to Antarctica as a cook, because she could not yet envisage herself as a scientist, but she wanted to experience the things described by the informants. Masako's statement 'I don't think I could study to be a scientist …' had the intonation of someone who is seriously considering an option for the first time.
One male student, who had previously wanted to be an explorer, changed his aspiration during the unit:

‘(I want to go and do) … research about how old the ice is and all the rocks and see what it's supposed to be joined up with … geology.’

There was evidence that the implicit focus on women disrupted the binary of "if woman/not Antarctica" and also influenced the boys' attitudes and respect for the women studied. Before they met Rachel Hamlin, a group of boys planned their questions for her:

*Jack:* ‘Nevin, Nevin, do you know what I am going to ask her? Have you had any children before? What did it feel like/Now you go 'Who's your boyfriend?'

After Rachel's visit, Jack wrote: 'I really enjoyed your slides about you going down the big crevasse.'

The data from the interviews revealed also that the boys experienced the female focus as inclusive of males. As Jim remarked: “Well, they were both ladies that came in and talked — yeah, and there's obviously going to be men expedition leaders, so he or she.”

However, the use of women in the written resources and texts was not found to have the same impact as the implicit use of women visitors to the class. Although the students had studied the work of Irene Peden, who went to Longwire Station at the South Pole and used radio signals to study ice, Jane 'remembered ‘that it was ‘this guy’” and Paul ‘remembered’ that it was Robert Scott who had done this work. The researchers concluded that the students’ gendered schema led again to the ‘William of Arc’ effect, where students attributed what they had learned about women to men. The study raises questions about the ways in which texts are used in social studies.

Alton-Lee, McBride, Greenslade and Nuthall (1997) provided a qualitative analysis of a peer discussion, after the students had heard both Rachel Hamlin and Margaret Clark tell a story of a ritual skinny dip that the New Zealanders took in freezing Lake Vanda in the Antarctic Dry Valleys. The story had a substantial impact on the students. The researchers explored the disjunctions the stories presented for students wherein 'skinny dipping' was simultaneously positioning women as naked subject of (imagined) male gaze, and as heroic.

These women both used the term 'wimp' to describe themselves, but both completed the dare and received badges to confirm their heroic acts. One boy, Ben, repeatedly told the other students that he would have signed the book as a 'wimp', rather than taking on the dare. Shane Town commented that in the light of his research with young gay men, Ben's choice to take a position as less than a woman and less than a wimp within a society that valorizes macho masculinity would have been deeply problematic for him (Town, 1998). Retrospective checking revealed that Ben's self-esteem score on the Coopersmith was lowest in the class and one of the lowest of any students in the school.

While the structuring of curriculum, and the implicit-woman usage, was the primary strategy used by Tania McBride, she also engaged the students in critical thinking about the positionings of men and women in curriculum. For example, she required them to check the evidence for claims made, name male-only scenarios, thereby making the explicit the male-only implicit discourse, and monitor the absence of women. Because the presence of women was structured into tasks and reinforced through a developmental sequence of tasks, the students were able to evaluate the schematic views they brought to the unit against the evidence.

The multiple 'first women' stories provided an invaluable resource to promote critical thinking, because they created doubt for the students about the veracity of the knowledge they were
encountering in the resource materials. Tania McBride encouraged the students to think of such claims as provisional and needing checking, rather than authoritative. She also effectively modelled critical thinking for the students that was later observed to be reflected in their peer conversations and self-talk. These findings demonstrate that gender provides an effective context for the development and use of critical thinking skills, as emphasised by Barr (1995).

The researchers used inverted commas to describe the 'ungendered' discourse, because the evidence about the students' participation and learning indicated that they reconstructed the ungendered discourse as gendered, in much the same way as students in the Alton-Lee and Nuthall (1991) study had used people to mean 'men'.

The fourth discourse identified was the multiple positionings (embodied).

The multiple positionings approach was not an approach that simply involved proliferating the numbers of people included in the curriculum unit. For pedagogical reasons alone, such a strategy would not support student learning, because the students would have insufficient opportunity to construct long term knowledge from brief mentions. Rather, the identities of the people included in the social studies curriculum were revealed as more complex. Within the visitors' stories, positionings of heroic, tidy, wimp, strong, weak, competent, adoring of animals, tough, clean, stern, fun-loving, knowledgeable and so on were evident to the students.

The authors named this strategy as 'deconstructing unitary identity'. Such an approach moves social studies away from the traditional comparisons of difference between people or peoples, and emphasises the fluidity of identity, and the differences within people. Evident throughout the unit for low-achieving Jim was that his dream of being an American fighter pilot appeared to limit the extent to which he considered other positionings for himself. The research raised the question about the need for teachers to identify boys' desires, and make explicit to them links with the curriculum, and the qualities, skills and knowledges that achieving such desires might involve.

An important aspect of the multiple-positionings approach to curriculum is that it does not use a politically correct selection or censoring of resources. The educational process itself enables students critically to evaluate the positioning of people in curriculum. However, the key to the strategy was the implicit and substantial use of women in the social studies curriculum:

'... if learners do not have access to instances of women in particular cultural, sociopolitical, geographic and historical contexts, then the male-only implicit discourse, although absurd, may be not only credible, it is likely to be an unquestioned given.' (p.57)

Once the strong and diverse images of women were included within the curricular materials, then the alternative representations depicting the implicit male-only discourses became valuable resources, both for the information they provided, and the opportunity they provided for the students to reflect upon the gendered construction of human experience.

Alton-Lee, McBride, Greenslade and Nuthall (1997) described the multiple positionings (embodied) discourse as:

'both a distinctive pedagogical discourse and a context within which the other discourses can occur. That the students encountered disjunctions between male-only implicit, female-implicit, male norm/female exception, female norm/male exception and 'ungendered' discursive encounters created a genuinely educational environment. ...the teacher's task design and pedagogical practice empowered the
students to think reflectively and critically about the veracity, reliability and authenticity of the information.' (p.57)

Alton-Lee, McBride, Greenslade and Nuthall (1997) argued for a re/positioning of the body in social studies, which they articulated as a curriculum of disembodied discourses. They suggested the silence about body has in itself contributed to gendered regimes that are not good for student well-being:

'Students responses to the discussion of bodies ... make transparent the disjunction they experienced when the silence of body as central to everyday human living was broken ... The mind/body dualism has excluded appropriate considerations of body in the context of a curriculum which aims to illuminate students' understandings of people ... There needs to be continuing vigorous debate about the ethics and age appropriateness of the ways in which students consider across the curriculum ... it is after all, through body that people are initially linked to their intersecting heritages and communities.' (p.64)

These researchers provided a consideration also of the problem of cultural lens in framing curriculum for students, and raised the possibilities for students and teachers to reflect upon a more global positioning of Antarctica than one that uses the entrée of the American military, and Scott Base, as a taken-for-granted framework. They called for more resources for teachers, providing material about the early Pacific voyages into Antarctica waters (for example: the voyage of Ui-te-Rangiora in the canoo Te-ivi-o-Atea). They noted that other students in the class perceived Japanese Masako's map of Antarctica to be wrong and upside down, because she did not have an atlas - 'only a Japanese one'.

In conclusion, Alton-Lee, McBride, Greenslade and Nuthall (1997) emphasised theory (the discursive analysis) as a pedagogical tool for teachers, and critical thinking skills as vital for students in an inclusive social studies programme:

'Inclusive education is sometimes portrayed as a less rigorous practice within which imagination, goodwill and 'right thinking' stave off the need for information, scholarship and critical reflection. (This research) challenges the complacency of views of 'teacher' and 'inclusion' implicit in such a portrayal.' (p.66)

They called also for urgent attention from social studies educators to attend to the complexities of the mind/body dualism as they are dis/embodied in the medium of the internet.

Alton-Lee, McBride, Greenslade and Nuthall (1997) highlight the importance of teacher education in developing shared discourses among researchers and teachers, and a collaborative model for development in educational practice. The contrary context was highlighted in an Australian study, where the discursive tools of the researchers were not part of the world of a teacher. Baker and Davies (1989), in a study of a lesson taken on the topic of sex roles in an Australian lower secondary humanities class, found the use of sex-role theory, with its embedded biological assumptions, to sustain inequitable gender relations, in spite of the teacher's intention to achieve the opposite. These researchers suggested also that the initiation-reply-evaluation format of traditional pedagogy sustains particular kinds of gendered regimes in the classroom, so that the pedagogy used contradicted the intended message. They concluded:

'The teacher and students here require a different type of discourse for articulating what they know and what they want to convey, for constructing more respectful and less oppressive theories and social relationships. They need different words to accomplish that analytic work.' (p.75)
SUMMARY

Alton-Lee and Densem (1992) have suggested a six stage framework for developing gender-inclusive curriculum, using teacher research, the deconstruction of gendered curriculum, strong and diverse representations of women, and reflexive practice.

Teacher researchers have carried out action research studies to explore the impact of a focus on women in the social studies curriculum.

Vincent's (1992) focus on World War I involved diverse students in interviewing their grandmothers, and building a class resource of the stories of German, English, Japanese, Pacific Islands, Māori and Pakeha grandmothers' experiences during the war.

Teacher action research movements can depend on substantial resourcing of facilitation, support and training from universities, or large, funded research projects.

The question is asked recurrently throughout this review about the ways in which fruitful interactions among theory, practice and research can help to create the tools for teachers to use in their analytic work.

A school-wide gender equity programme in an intermediate school was shown to have positive effects for both boys and girls, and was well-supported by parents.

The use of an implicit woman-focus in a study of Antarctic survival was found to influence patterns of male bias in teacher-pupil interaction patterns in two intermediate classes. As the units progressed, the proportion of males to females participating became proportionately more equitable.

Both girls and boys responded positively to the opportunities for learning presented by two (women) informants with Antarctic experience.

Boys' positionings of a young woman informant as female/reproductive/sexual/mother disappeared after they participated in a session she led, explaining Antarctic life and work, and using artefacts of Antarctic clothing to explain her experiences and human adaptation to a harsh environment.

A discursive analysis of the discourses of gender in the Antarctic social studies unit provided a tool for teachers to use in developing gender inclusive curriculum. Male-only implicit, male norm/female exception/, ungendered and multiple positionings (embodied) discourses were used in disjunction with each other, to support students' critical thinking about gender.

A discursive analysis revealed that the discourse that excluded women offered limited and problematic positionings for males.

Male-only implicit and male norm /female exception discourses were seen to convey a message that participation (in Antarctic work) may relate to genitalia rather than skills, abilities and interest.

This research indicated that ungendered language is re-gendered by students.

Multiple positionings approaches, where each of the discourses was evident in the curriculum, and students themselves were involved in identifying and reflecting on disjunctions in the discourses, were found to be most effective educationally.

This approach renders male-focused resources valuable to promote critical thinking in social studies as long as strong alternative representations of women in varied roles are available.

…/continued on next page
Summary (continued)

This research suggested that social studies should focus more on deconstructing unitary identity than creating sharp contrasts between people. Individuals who are brave, wimps, fun loving, organised, geologist, animal loving and so on present students with rich understandings of the complexity of life.

Although the (women) informants who spoke to the children had a marked impact on both girls and boys' information about women in curricula, texts were later 'remembered' to be about men. The 'William of Arc' effect recurred, in spite of the implicit woman focus.

The ways in which the students responded to discussion of body, in the context of adaptation to the harsh environment, raised questions about the silence about body in social studies.

A question was raised about the educational implications of the complexities of the mind/body dualism as they are disembodied in the medium of the internet.

In her recent study of teacher management of the learning of new entrant boys, Diggins (1998a) focused not on curriculum, but on the teacher's management of the physical and social environment in the classroom to support the learning of boys. Diggins (forthcoming) doctoral research in progress draws on post-structural and social constructionist theories to explain gendered processes and learning for new entrant boys.

Diggins' employs a proxemical analysis of the use of classroom space as students and teachers position themselves in relation to each other as they negotiate classroom activities. In her (1998a) case study, Diggins used sequences of visual representations of classroom incidents to depict and explain the teacher's approach to classroom management. In Brian is under the table: A proxemical analysis, Diggins (1998a) showed how a skilful teacher used classroom equipment as an intervention. Ms Nikora, the teacher, encouraged a new entrant boy to emerge from under the table where he frequently placed himself in a marginalised and possibly for him, safe position.

When Ms Nikora wished to encourage Brian to participate, she did not direct him but rather moved to the table with a doll, representing a sick baby in the context of the social studies curriculum topic. Ms Nikora role-played variously the roles of nurse and doctor as she attended to the sick 'baby'. Brian slowly emerged from under the table and joined in. Ms Nikora continued an interaction using the sick 'baby' until other students, attracted by the 'baby', joined in. Ms Nikora remained with them, scaffolding the other students into Brian's play until a co-operative group activity was in progress.

Diggins (1998b) used her proxemical analysis also to explore the power of the non-verbal in constructing gendered regimes in classrooms. In a sequence of vivid images, Diggins (1998b) depicted the experience of a new entrant Māori boy when he discovered a long satin pink dress, pearls, and high heeled shoes in a dress up box. Diggins (1998b) deconstructed Campbell's delight in touching the fabric, playing a fantasy role, taking the centre stage in a performative act and many other aspects of the child's experience with the objects. The sequence of images fleeting shows a look given to Campbell by a pre-service male teacher when it is apparent that he is wearing a dress, pearls and high heels. Within a split second, the boy threw off the clothes and retreated. Diggins (1998b) explores the nature of the gendered power regime which made such a transgression against his masculine positioning as boy.

Diggins' (1998a) work is a series of case studies of new entrant boys. These were developed to assist pre-service and in-service teachers to understand the role of a teacher's management of the sociocultural environment in constructing positions for boys that support their well-being, participation and learning within classrooms. The case study was developed within the ERUDITE Programme [Educational Research Underpinning Development in Teacher Education] in partnership...
with a pre-service and in-service teacher education programme. Regrettably the courses were discontinued while Diggins’ research was in progress.

Also within the ERUDITE Programme, a case study was developed of the interactions between a five year old girl and a nine year old boy that were in contrast to the usual pattern of gendered interactions in classrooms. Five year old Caitlin repeatedly taunted nine year old Zack ’Hey, Spina Bifida, boy!’ The teacher used an approach influenced by Rietveld's (1998) work on inclusive practice with children with Down syndrome; where Rietveld contrasts the personal tragedy approach with a social constructionist approach to inclusion. Rietveld demonstrates the ways in which the well-intentioned and compensatory personal tragedy approach is not appropriate or educational.

The teacher, to develop well-informed and respectful understanding of Zack’s abilities and contributions among the other children, also drew upon a theoretical framework, developed by Banks (1995) to intervene in the curriculum. Among other approaches, the teacher used multiple stories of students with spina bifida, publicly positioned Zack in a shared category of male cricketers and involved Zack as an older peer helper to the new entrants. These strategies had a powerful impact on the students, many of whom remembered Zack as 'the boy that taught us to skip' after his involvement as a peer helper, rather than 'Spina bifida boy' (Alton-Lee, Rietveld, Klenner, Dalton, Diggins & Town (forthcoming).

A further case study in social studies was developed within the ERUDITE Programme to engage teachers in-depth with the problem of students' reluctance to participate in class discussion. One case study with a six year old Māori girl shows how, when a skilled teacher deftly uses a transition to a circle format, (changing the physical and social environment), a child who was reluctant to participate tells the whole class her experience of hospital. The case study is used also to illustrate the ways in which a teachers’ success in involving quiet or non-participating children in class enables other students to learn, and benefit from the child's knowledge. An interrupted narrative format was developed to assist in presenting the research in such a way that teachers would engage with the case study dilemmas; they would then make their own predictions about how classroom processes might facilitate student learning and participation (Alton-Lee, Diggins, Klenner, Vine & Dalton, forthcoming).

Also through the ERUDITE programme, Vine (1998) and Vine, Alton-Lee, and Klenner (forthcoming), explore the effective ways in which a teacher enabled a Samoan new entrant, who was new to the English language, opportunities to become part of the classroom community through learning social studies, and not just English language.

The latest work-in-progress in the ERUDITE programme develops a case study of an incident when a teacher heard the word 'mongrel' called out by one of the boys in her class (Alton-Lee, 1999; Alton-Lee, Town & Diggins, forthcoming). The teacher stopped the class and asked the boy calling out to identify himself and explain why he used the word. The case study deconstructs the action that follows as each student is invited to explain how they feel about the use of the term 'mongrel'. A 14 year old boy of Māori and European ethnicity explains that he does not like to hear people being referred to in words that are generally used for a dog.

At a critical point in the pin-drop silence that occurs during the discussion, senior staff enter the classroom and move up and down the class rows checking on school uniforms, because the following day there will be an open day to attract new parents to the school. A case study Māori student is removed from the room for wearing non-regulation shoes. The teacher and researchers explore together the tensions for teachers working in current schooling contexts to do social studies that genuinely challenge the racism found to be lying beneath the surface of New Zealand social studies

### SUMMARY

A series of case studies in the ERUDITE Programme [Educational Research Underpinning Development in Teacher Education] have been developed, focused on issues of student participation and well-being in social studies. Diggins (1998a, 1998b) produced a series of case studies for teachers-focused on boys in a new entrant class.

Diggins (1998a) included a case study of a teacher’s skilled intervention in providing an environment that enabled a new entrant boy to emerge from under a table and participate in class. She also developed a case study demonstrating the power of a non-verbal communication in signalling to a new entrant boy that he was transgressing the gender regime – “being a girl”.

A further case study was developed, using an interrupted narrative technique. The case study was designed to engage teachers in discussing research about a teacher’s skilled management of classroom processes to scaffold a Māori girl to participate in public discussion.

One recent ERUDITE case study explores the theoretical tools a teacher used to develop a programme that would support new entrants students’ knowledge of, and attitudes to, an older student with spina bifida. The case study focuses on the teacher’s effective use of multiple positionings approaches to counter verbal abuse by a five year old girl to a nine year old boy.

The ERUDITE studies provided a research approach within which teacher education, action research, theory, practice and classroom research were involved in a dynamic relationship, to generate case studies to assist teachers in developing inclusive educational practice, and supporting the learning of diverse learners.

### 10.7 RESEARCH ON GENDER AND ENACTED SOCIAL SCIENCES CURRICULUM IN SECONDARY SCHOOLS

Nairn (1991) carried out a study of teacher-student interactions in 37 classes in secondary school geography. The study was conducted in 14 coeducational secondary schools in and near Christchurch. More female students (56%) were studying geography than male students (44%) across the sample; however, 80 percent of the geography teachers were male. Nairn found that in 30 percent of the sample classes, the average number of student-teacher interactions were relatively gender equitable (within a range of plus or minus 4%). In 13 percent of the classes, she found that girls took up more of the teacher-student interactions. However, in over half (57 percent) of the classes, boys took up a larger proportion of the student-teacher interactions. Nairn concluded:

‘Research has shown that talking aloud is an important way of processing information, and teacher-student interaction is an important way of checking a student’s understanding of information ... As teachers are a scarce resource in the classroom, so we need to be aware of and work at ensuring that there is equity of attention distribution among our students both female and male. The distribution of teacher-student interactions was equitable in 30 percent of the classes observed. It is attainable — Let us work towards equity in the remaining 70 percent of the classes.’ (p.15)

Nairn (1993) developed her earlier research through an in-depth analysis of student perceptions of geographers and student/teacher interactions, during geography in two fifth form geography classes and two seventh form geography classes. Students were initially asked to draw pictures showing what geographers were like. A total of 113 students drew geographers and slightly more than half of these were female students. Only 14 percent of the images depicted female geographers, although 9 percent depicted female geographers, with male geographers. The majority of the drawings (73%) depicted
male geographers and 61 percent of girls studying geography drew male geographers. Nairn (1993) concluded that the majority of her sample of secondary geography students ‘think that a geographer is a male physical geographer who works outdoors’ (p.374).

Nairn found that 61 percent of the public student/teacher interactions were with male students across these classes, reflecting closely the finding in Kelly’s (1988) international meta-analysis that 60 percent of teacher interactions were with boys. Nairn analysed her data to explore who were the silent or quiet students in these classes. She found that the most frequently participating boy engaged in twice as many interactions as the most frequently participating girl. However, while 47 percent of the girls were silent, 33 percent of the boys also never participated in public discussion in at least one lesson. Nairn pointed out that it is important to identify exactly who the quiet students are (rather than depending on averages to inform strategies) so that the ‘appropriate students can be targeted to modify their verbal behaviour’ (p.27). Nairn also pointed out that her findings ‘challenge the myth that all male students are naturally noisy and therefore naturally dominate the public verbal space of classrooms. Gender differentiation alone cannot explain male domination’ (p.27).

In elaborating her theoretical perspective, Nairn (1995) cited Young: (1990:45) ‘(for) women’s and men’s propensities and dispositions to behave in typical ways … to be actualised … practices and institutional structures must encourage the disposing behaviour” (p.27). This argument reinforced Nairn’s view that teachers can change inequitable patterns in classroom interactions. Like Alton-Lee and Densem (1992), Nairn suggested that the curriculum should be the first point of intervention. Nairn (1995) worked with the students’ teachers to develop women-focused units. She negotiated the introduction of a turn-taking intervention in the fifth form class, observed the implementation of the units and carried out follow-up interviews with the quiet and relatively ‘vocal’ students to explore further the nature of student public participation and curriculum in secondary geography. Two thirds of the quiet female students, in both the 5th and 7th form classes, said that they participated more during the women-focused lessons. These students reported that they liked the content better, found the topic more interesting and found that it was more relevant to their own experiences.

The turn-taking strategy was supported by opportunities for the students to think of ideas, and rehearse these with their neighbours before participating publicly. The intervention required each student to have an opportunity to speak without interruption or response from other pupils. Students were also offered the option of declining to speak. In the event, only one male student took up this option. Nairn found that the quiet female students were very positive about the turn-taking strategy, and enjoyed the experience. The quiet male students were positive, but focused on the benefits for other students rather than for themselves directly. One male student did not like the strategy. Nairn (1995) suggests that educators must change the structure of public participation in their classes so that there are ‘minimal risk’ opportunities for quiet female and male students to participate publicly.

T.M ten Dam (1995) reported on an intervention into the history curriculum with 500 students aged 14-16 in the Netherlands. Eleven classes were taught traditional history, and eleven classes were taught women's history. Girls had a more positive response to the intervention than boys, but the researcher concluded that the effect of the intervention was to ghettoise the women's history intervention. The focus on women signalled a lower status curricula focus to the students; T.M ten Dam (1995) concluded that women's history should be integrated into mainstream history, rather than ghettoised as an additive low status intervention.

McNeight (1998) carried out an action research study, in a 6th form class in a single-sex girls school, designed to enable Samoan girls to make explicit links between the Classical Studies curriculum and their own cultural experiences and heritages. The study was the first in a planned cycle of interventions within both Classical Studies and Art History. The intervention involved students in a
planned discussion with either a significant other at home, or within the peer group, with the purposes of discovering associative links with their own cultural experiences. The students were studying the Roman Religion and the Aeneid. The students' assessments were compared before and after the intervention showing that their achievement scores appeared to at least double. The students shared the links they were making with the researcher:

*Helen* 'We talked about festivals that they had like sort of similar to the festivals we have in our culture.' (p.17)

McNeight (1998) found that the intervention was not only successful at the time, but provided a venue for a shared dialogue between the girls and family members about their learning in Classical Studies. For example, McNeight (1998) noted that, after the study, Mi'i remarked 'My mum, she brings it up all the time now. She wants to know what we are learning in classics.' (p.21).

Lee (1996) spent four months as a participant observer in a senior high school geography classroom in a Western Australian school. The students were largely from non-professional backgrounds. Her observations led her to conclude that, in spite of much research on gender, there has been little change in gender relations in schooling:

'Boys appear in this account as relatively free inhabitants of the space of the geography classroom, producing themselves as particular kinds of masculine subjects within the social/academic language of the site. Through various tactics, boys controlled the physical and spoken discursive space and, in doing so, constructed solidary relations with each other and with the teacher, Alex D, which functioned to 'other' the girls in the class in a number of ways. Together, these processes produced a tangibly masculinist cultural dynamic in the classroom.' (p.72)

Lee (1996) observed that literacy within the context of school geography was a deeply gendered classroom practice:

'while boys talked, girls wrote. In terms of quantity, each of the girls consistently wrote more than any of the boys on individual assignments. All of the girls kept more complete and more organised records of their written work than any boy.' (p.80)

Lee (1996) observed that, for geography and social studies teachers, writing was feminised in opposition to masculine 'doing'. Teachers' understandings of the gender/writing relation were critiqued by Lee. She found the most common explanation to arise out of developmental psychology. This was the maturational argument, whereby boys' generally poorer performance in writing was explained as an issue of maturation. Lee (1996) identified two problematic aspects of this explanation: (1) 'the direct equation of development with writing abilities', and (2) 'an indirect linking of development with matters of discipline, control and responsibility' (p.81). Lee (1996) found also a contradiction in the teachers' acceptance that these boys were not likely to identify masculinity with writing, and their acceptance that the boys' talk would dominate the classroom:

'... it seemed possible for the boys to say whatever they wanted, whenever they wanted, for most of the time. Alex D (their teacher) saw this as not inconsistent with macho-ness, an interesting interruption to the 'strong-silent' stereotype often invoked in conjunction with this category. This may be a function of the overlap of discourses of gender and of maturation. Chatter may be appropriate for macho boys as distinct from macho men.' (p.82)
In a preface to Lee's (1996) book, Allan Luke suggests that her research reveals implicit codes of a kind of 'boardroom' practice occurring in the classroom, where "what is on the 'written record' … may have little to do with the wages of power'(xiv). He interprets Lee's analysis as revealing that within schooling:

'writing is the fetishized 'surface' of power, while the institutional capillaries of power may occur in a less analytically recoverable, more covert 'black market' of male spoken discourse, ritual and off the record enculturation.' (p xiv)

**SUMMARY**

Nairn's (1991) study of teacher-student interactions in 37 geography classes showed boys to predominate overall on average, but exceptions were apparent in classrooms where girls participated in more public interactions. Nairn called for more attention to the gendered processes surrounding quiet students both male and female.

Nairn investigated the perceptions of secondary students about their participation in class in the context of women-focused units in secondary geography. A turn-taking strategy was used to enable quiet students to participate.

Overseas research suggests that the strategy of integrating women's focused resources into mainstream curricula is more effective than creating additive or special programmes. Students have been found to value poorly alternative or additive programmes focused on women.

McNeight (1998) carried out the only action research study retrieved that focused on Pacific girls' experiences in social studies. A strategy was developed to involve Pacific girls in talking to a 'significant other' of their own culture about the possible links and associations between the classical studies curriculum and their own culture.

This intervention appeared to have a substantial impact on the students, whose assessment marks doubled on average.

Lee (1996) used a post structural analysis to explore the gender regimes of a secondary geography class in Australia. She found that boys talk and girls write in geography. Boys move and take up space and girls do neat work. It was suggested that boys may be practising gendered behaviours that afford 'boardroom power', where what is not on the record shapes what really happens.

### 10.8 BOYS AND MASCULINITY

What is evident in this review of research on gender and social sciences curriculum over the focus decade (1989-1999) is that, in the one curriculum area focused on people in society, research focused on masculinity is notably sparse in the New Zealand literature. While there has been a substantial body of research pointing out that, on average, boys take up more teacher time and public verbal space, this behaviour has not been problematised in relation to masculinity. Interestingly, where masculinity has been signalled as a key issue in New Zealand social studies curriculum, it has been so signalled by women rather than men (eg, Benson, 1998; Diggins, 1998a; 1998b). A number of curriculum leaders and researchers in social sciences education in New Zealand have recently and specifically addressed many critical issues relating to diversity, participation, citizenship and conflict management, that could be relevant to a consideration of masculinity in social sciences education (for example: Barr, 1998; Smythe, 1995; 1998; Keown, 1998, Ward & Tapp, 1998; Bloomfield, 1998).
Research focused on masculinity within social studies is sparse.

Social studies is the area of the curriculum focused on people and human interaction, yet little work is available that theorises masculinity in social studies.

Given the active role of social studies in the stratification of differential student achievement as students progress up the school, such research and development is urgently needed.

Research is needed that explains how gendered regimes in social studies are influencing diverse students.

10.9 TEACHERS, TEACHER EDUCATION AND GENDER IN SOCIAL SCIENCES EDUCATION

Throughout this chapter, it is evident that the role of teacher research in producing situated knowledge about gendered regimes in social studies has been central. Much of the research has been produced out of productive interactions and collaborations amongst teachers, schools, colleges of education and university programmes. This research field is notable for the educational developments that have been both achieved and critically evaluated. The recent research places more emphasis on the teacher’s knowledge and less on the resources alone.

More recent studies into the cultural construction of classroom participation in social studies are focused on development that opens up the possibilities for both girls and boys, while being valuing of them. This chapter illustrates research that explores the interplay between gender, ethnicity, sexuality, and social class. The little research available about gender and dis/ability indicates that regimes of power around disability create disjunctions in traditional gender relations.

The findings for Māori Immersion classes indicate these contexts are particularly supportive of both Māori boys and Māori girls.
Chapter Eleven: Gendered Behaviour in Schools

Much of the literature reviewed for the curriculum areas in the decade since 1989, has taken girls as its focus. By and large boys, have been the silent (but powerful) partner, in a dualism positioning girls as the comparatively disadvantaged, in terms of achievement and participation, in valued subjects such as mathematics and science. This positioning of boys has meant that the category 'boy' and masculinity has remained largely unproblematised, while girls and femininity have been at the sharp end of the theoretical stick. However, increasingly over the decade, theories of masculinity have become prominent, as educators and social scientists have sought to explain the over-representation of boys in negative social and health outcomes, and theorise the links between some forms of masculinity and the denigration of girls and women.

One of the implicit findings in the literature in each of the curriculum areas of this review has been the problematic behaviour of some boys and the problems this causes girls and some boys in schools. In this chapter, we explicitly examine some of the indicators of boys’ and girls’ engagement with, and behaviour at, school, and review the key arguments that have emerged to explain these patterns from the gender and masculinities literature.

While our discussion focuses on school behaviour, we acknowledge the wider context of families and community and outcomes beyond those directly related to the school environment (NZHR, 1996). Schools are theorised as part of students’ social milieux, with school policies and practices involved in supporting or constraining some behaviours. (Connell, 1993; Gilbert & Gilbert, 1998; Mac an Ghaill, 1994).

11.1 APPROACH TO THE REVIEW OF GENDERED BEHAVIOUR AND WELL-BEING

To provide a context for a discussion of gendered behaviour, the first part of this chapter surveys official indicators of engagement with schooling. These indicators are by definition negative, and generally provide information about extreme behaviours, such as truancy and suspensions. To address both problematic behaviour, and classroom behaviour more generally, the body of this chapter examines common theories of gender relations and masculinities, and follows with a discussion of classroom-based research informed by these theories. Research is organised by sector, with primary research discussed first. The implications of this research for intervention are drawn out in a critical discussion of strategies.

11.2 TRUANCY

Currently, there are no national statistics regarding truancy by gender. However, in an analysis of data from the Christchurch Health and Development longitudinal study, Fergusson, Lynskey and Horwood, (1996) found no gender differences in truancy rates. By the age of 16, 39.2 percent of males and 40.4 percent of females had truanted. Results from this cohort also showed that from age 12, when a very small percentage of students truanted (3.0%), the percentage of students truanting grew exponentially until the age of 16. While for most teenagers, truancy was infrequent and occasional, a small percentage (7.1%) truanted frequently. Regression analyses showed high rates of truancy in adolescence were predicted by early conduct problems (age 8) and family dysfunction, conflict or compromised parenting. Socio-demographic factors and school achievement factors were related to family functioning, rather than being directly predictive of truancy.

The TIMSS study also asked students how many time they or some friends had skipped class in the last month. TIMSS data for form 2 and 3 cohorts were not broken down by gender, but most students reported they never skipped class (form 2, 83%; form 3, 78%). Walker (1998) reported that at school
leaving age, almost 60 percent of students reported skipping class at least once, with no substantial overall gender differences in responses. However, truancy varied with respect to ethnicity. Asian students were least likely to report truanting behaviours, while Pacific students were most likely to report they skipped class five or more times in the month prior to testing. Walker notes Pacific females (35%) were more likely than Pacific males (13%) to be in this category.

11.3 SUSPENSIONS

Up until 1996, when the Ministry of Education published guidelines and official forms for the notification of suspension from school, suspensions advice provided to the Ministry was unreliable. Reliable information about suspensions from schools is currently available for the year beginning July 1996 and ending June 1997 (Sturrock, 1998). The following discussion draws on this information.

Definitions of Suspension

An unspecified period suspension, is a suspension exceeding three days and requires a meeting of the Board of Trustees. At the meeting the Board decides whether to: lift the suspension with or without conditions; extend the suspension; or expel the student. Students can only be expelled when they have reached the school leaving age of 16. A specified period suspension lasts for three days or less.

Table 11.1 below shows the number of suspensions from school by type of suspension, gender and ethnicity. Ninety-eight percent of the school age population do not feature in suspension statistics. However, of those students who are suspended, 73 percent of all suspensions (n = 8038) are males. Males make up 72 percent of specified suspensions and 75 percent of unspecified suspensions (Sturrock, 1998).

Males outnumber females in the suspension statistics across all ethnic groups and both types of suspension. The suspension rate per 1000 students for Māori (35.8/1000) was more than three times that of the Pakeha rate (10.9/1000), and the Pacific rate was almost twice that of Pakeha students at 19.3 students suspended for every 1000 Pacific Island students.

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5 Note that from the third term of 1999, the rules governing the suspension of students were modified and new recording forms were made available to schools.
### TABLE 11.1 NUMBER OF SUSPENSIONS IN STATE SCHOOLS BY ETHNICITY AND GENDER OF STUDENTS AND BY TYPE OF SUSPENSION, 1996-1997

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Gender/Type of Suspension</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female specified</td>
<td>Male specified</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>European</td>
<td>811</td>
<td>368</td>
</tr>
<tr>
<td>NZ Māori</td>
<td>941</td>
<td>499</td>
</tr>
<tr>
<td>Pacific</td>
<td>170</td>
<td>60</td>
</tr>
<tr>
<td>Asian</td>
<td>22</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td>Unknown- missing</td>
<td>33</td>
<td>35</td>
</tr>
<tr>
<td>Total</td>
<td>1997</td>
<td>970</td>
</tr>
</tbody>
</table>

Source: Sturrock (1998, p.45). *Includes 36 specified and 27 unspecified suspensions, where gender is not known, therefore percentages do not add to 100.

With respect to age, the vast majority of students were suspended at age 13, 14 and 15 years: 81 percent of females and 69 percent of males receiving suspensions were suspended at these ages. Fourteen year old students of both genders had the highest suspension rates (females 35% of all suspensions and males 27% of all suspensions).

The main reasons for suspensions in the 1996/1997 period were: physical assault on another student (21%), continual disobedience (21%), incidents involving drugs (15%), and verbal assaults on staff (11%). Theft and alcohol accounted for about another seven percent of suspensions each. Sturrock (1998) notes that this pattern of behaviours leading to suspensions generally held across all ethnic groups, but Pakeha/European students were slightly more likely to be suspended for disobedience, Māori students for drug related incidents and Pacific students for physical assaults on other students.

More than one third of suspensions given out in the 1996/1997 year were unspecified suspensions (exceeded three days). Of these suspensions, one half were extended at a Board of Trustees meeting, 44 percent were lifted and four percent resulted in expulsion from school. Sturrock (1998) notes that, while there was only limited and incomplete data available on those students whose suspension was extended, indications are that about half of these students ended up attending another regular school. Further, that one quarter enrolled at the correspondence school and one tenth returned to the school that first issued the suspension. Pacific students were more likely to enroll at a new school than Pakeha and Māori students.

### 11.4 BULLYING AND VIOLENCE

In recent years, definitions of violence and aggression have moved beyond physical abuse to a continuum that recognises verbal, sexual and psychological/emotional and relational abuse (Kenway & Fitzclarence, 1997; Owens, 1995). Local information about all these forms of aggression and
violence are canvassed in this section where available; otherwise, overseas figures are used to indicate/speculate about the probable extent of such phenomena in New Zealand.

National statistics on bullying/school violence by gender were not available at the time of writing this review. However, international studies (Whitney & Smith, 1993), and analyses that have been completed locally suggest bullying/school violence is a problem for a significant number of students (Martin 1996, 1997; Walker, 1998; Maxwell & Carroll-Lind, 1996). For example, in the TIMSS study, 39 percent of standard 2 and 35 percent of standard 3 students indicated they thought another student might hurt them in the last month; and 59 percent and 55 percent of standard 2 and 3 students respectively indicated that some of their friends were hurt by other students in the month prior to being tested. This pattern was similar across ethnic groups, and there were no significant gender differences (Martin, 1997).

In analyses of responses made by the form 2 and 3 cohort of TIMSS, 52 percent of form 2 students and 46 percent of form 3 students reported that some of their friends were hurt by other students at least once in the month prior to testing. Thirty-seven percent of form 2 students and 36 percent of form 3 students indicated that they thought another student might hurt them in the month prior to testing. Martin (1996) reports that bullying was more prevalent among boys than girls in the age 13 cohort. In contrast, only eight percent of school leavers in the TIMSS study reported they had been threatened by another student in the last month. Asian males were the most likely to report they experienced threatening behaviour (18%) and Pacific girls the least likely (1%). All other sub-populations based on ethnicity and gender were at 5-6 percent (Walker, 1998).

Maxwell and Carroll-Lind (1996) surveyed 259 intermediate age children from 9 schools about their experiences of violence. The authors’ goals were not to scope the prevalence or incidence of violence in New Zealand, but to examine the range and variety of experiences that children find fearful or harmful, and the significance of these experiences for the children. Their sample represented quite a small proportion of children of intermediate age from these schools, but is nevertheless sizeable.

Significant proportions of children reported they had experienced some form of direct physical or emotional violence from other children. For example, 63 percent of girls and 79 percent of boys reported that they had been punched, kicked, beaten or hit by children in their lives, while around 50 percent of boys and girls reported these incidents had occurred in the last 9 months. Around half of these incidents happened while children were at school and one fifth at home. Boys were more likely than girls to report that they had been in a physical fight with children in the last nine months (36% and 12% respectively).

With respect to emotional violence, about equal proportions of boys and girls reported having tales told about them, catty gossip, or being narked on (62% girls 57% boys). More girls than boys reported they had been threatened, frightened or called names in the last 9 months (70% girls, 65% boys) and being ganged up on, left out, or not spoken to (52% girls, 29% boys). Of the incidents of physical and emotional abuse involving other children, being in a physical fight or being ganged up on by other kids were the incidents rated most negatively by the children.

Stein (1995, 1996) links bullying to a particular form of gendered violence, in sexual harassment. Stein cites two surveys conducted in the United States that indicate up to 85 percent of girls experience sexual harassment. Through her work in the areas of bullying and sexual harassment in schools, she concludes that it is crucial that educators make the link between these expressions of violence, as she sees bullying among young children as a practice ground for later sexual harassment. Stein suggests that initially, the problem should be presented as ‘bullying’ to young children before making the link to sexual harassment, in order that the problem is accepted by boys and girls as
problematic. However, both Stein, and Larkin (1994), note the importance of ‘naming’ sexual harassment in order that it be taken seriously and addressed within schools.

Sixty-nine percent of the 327 teachers who responded to a survey on student behaviour issues in 1997, self-reported they had personally experienced some form of abusive, aggressive or threatening behaviour in the past 12 months (PPTA, 1997). A breakdown of students involved in aggressive behaviour indicated that boys, particularly those in forms 4 and 5, were the source of problems for teachers. Verbal abuse was the most commonly reported threatening behaviour, with 58 percent of the sample stating this form of abuse had occurred at least once in the past year.

### SUMMARY OF GENDERED PATTERNS OF BEHAVIOUR AND WELL BEING

This summary includes some of the behaviour statistics given in the Health and Physical Education chapter:

- Boys, particularly Māori boys, are over-represented in suspension statistics
- Boys up to the age of 15 are more likely to report some form of disability than girls. In middle childhood, boys are more likely to have learning or behaviour problems. In adolescence, higher rates of disordered mental health among young women are accounted for by depression and anxiety disorders. Boys are much more likely to be in receipt of assistance from Special Education 2000 high needs-initiatives than girls.
- Significant proportions of boys and girls are likely to experience some form of bullying or harassment at school. Overall, experiences of bullying differ with age, gender and ethnicity. However, boys may be more likely to experience being in a physical fight, while girls may be more likely to experience exclusion. International studies suggest sexual harassment is likely to be experienced by the majority of female students.
- Adolescent boys and young men are more likely to complete suicide or die from motor vehicle accidents than young women. Girls and young women are more likely to attempt suicide. Young Māori males and females are more likely to complete suicide than then non-Māori counterparts.

### 11.5 EXPLAINING DIFFERENCES

While gendered behaviour patterns are evident in the literature, often the risk factors or reasons for those (negative) outcomes are not discussed with respect to gender; rather common factors associated with the outcomes are cited, or gender is taken as a risk factor in itself. For example, social and educational disadvantage, and adversity within the family, are risk factors commonly associated with suicide — however, these factors do not explain why more males complete suicide, but more females attempt suicide.

To explain these patterns, the role of gender in social well-being and behaviour needs to be theorised.

Gilbert and Gilbert (1998) critically reviewed the evidence for theories commonly used to account for the behavioural difficulties and ‘crises of boys’. They contend popular arguments rest on contradictory forms of essentialism and constructionism. Essentialist arguments hold the view that there is a core personality, trait or character that defines masculinity and which all men actually or potentially share (an essential man). This may be linked to biology or genes. Constructionist arguments look to the way masculinity/ies and femininity/ies are socially prescribed and enacted, in a specific historical and cultural context.

Stated most simply, these arguments boil down to the relative influence of nature and nurture in the production of gender difference; a vexed argument, but important for its implications for the strategies used to support the well-being of boys and girls. The work of Gilbert and Gilbert (1998) and arguments from other theorists are reviewed in the following section.
11.6 ESSENTIALISM

Gilbert and Gilbert (1998) discuss two varieties of essentialism: psychic essentialism and biological determinism. Explanations drawing on psychic essentialism: “sees masculinity as a psychological force which governs the state of the male psyche, and which specifies the content of the masculine personality” (p.32) The exact form of the psyche varies from author to author, the common thread being that modern men and boys have lost touch with their essential/spiritual selves. This leads to poor outcomes for men. The commonly-cited, popular author Steve Biddulph (1997), author of “Raising Boys” fits into this category of explanation. For Biddulph, the pressures of modern life cause men to deny their essential masculinity, inherited from Cro-magnon man, causing a rupture in the psyche. The implications of this argument are that men need to reconnect to the ‘real’ selves to improve their well-being and the well-being, of society. Gilbert and Gilbert (1998) critique arguments that assume an essential, unalterable self on a number of fronts. Specifically in relation to Biddulph, they argue his thesis of the origin of the essential man stretching back to Cro-Magnon man is based on a simplistic and inaccurate picture of gender relations in pre-history, that evidence shows were varied. More generally, the idea of a universal and unified masculinity, marginalises considerable historical and cultural change, and devalues the diversity of human cultures.

In short, in these arguments, men as a group are homogenised. In arguing for one, true way of being a man, any change or pressure in conflict with the essential self is rendered problematic; possibilities for re-creation, change and flexible responses to the world are minimised as the solutions to problems of boys and men are sought in getting in touch with a universal masculinity. Similar ideas of a universally-shared femininity in some schools of feminism (eg, radical feminism) have also received criticism for their inability to account for the diverse experiences of women from different social classes and ethnicities (Jones et al. 1995; Kenway et al. 1997).

Other explanations for gender differences in social and well-being outcomes with an essentialist flavour rest on biological arguments: hormonal, structural and genetic. Historically, such arguments have contended that women’s emotionality, supposed lack of reason and inferior intellect are related to their reproductive systems and their smaller brain size (McDonald, 1992). More recent arguments include the brains of males and females being structured differently, leading to variable social and cognitive strengths and weaknesses, and thus different hormones lead to different behaviours in men and women.

Clearly, many of the arguments levelled against psychic essentialism can be born in mind when discussing biologically reductive theories. Two points are particularly relevant: the first is to consider the diversity of men’s and women’s experiences across time, and between and within cultures, which strongly mediates any assumption of homogeneity within the sexes; the second is to acknowledge that biologically-based assumptions exclude the possibility for change.

In their review of the literature in relation to the brain structure and hormone based arguments, Gilbert and Gilbert (1998) begin by noting that these arguments equate concrete and measurable differences in biological make up (brain structure and hormone levels) with aspects of behaviour which are less tangible and difficult to measure. With respect to brain structure, Gilbert and Gilbert conclude that what evidence there is, is contradictory and that our understanding of the brain is too rudimentary to support conclusions about behavioural gender differences. In regard to hormonal theories of gender differences, particularly those related to aggression, they cite a wealth of material that, taken as a whole, do not support the primacy of biology in the expression of aggression. For example, in a meta-analysis of 64 experimental studies of aggression, Bettencourt and Miller (1996) found that men, on average, were slightly more likely to be aggressive than women (d=.22). However, this difference masked the mediating role of provocation in reducing gender differences. Under highly provocative conditions, women were just as likely as men to be aggressive. Other mediating factors included the
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fact that men were more likely than women to judge a situation as provocative, and women were less likely to be aggressive when their fear of retaliation was higher than that of men. Bettencourt and Miller conclude that their results were consistent with a social role explanation of gender differences in aggression.

In concluding their review, Gilbert and Gilbert (1998) assert it is over-simplistic to reduce behaviour solely to biology, citing the great variety of behaviours and outcomes - within the sexes and across cultures and time (see our discussion of biological explanations of difference in Science, Chapter Four). The ‘unfixed’ nature of gender differences in outcomes, for example, the shrinking difference in mathematics performance cited earlier in this review (Friedman, 1990), - suggest causal influences that are less static than those suggested in essentialist formulations. In addition, Gilbert and Gilbert (1998) note that the body is an open system not a closed one. Thus, differences in outcomes cannot be reduced to difference in structure and biology as these systems too are open to environmental influences (think of nutrition, exercise, and learning for examples); one can predict very little about an individual's behaviour based on their sex alone. With respect to intervention, the Gilberts (1998) write:

‘To increase rather than constrain the possibilities for boys, we need to broaden our view way beyond the biological. As Connell points out, “masculinity is not a biological entity that exists prior to society; rather, masculinities are ways that society interpret and employ male bodies”. Accordingly, we need to focus on the social practices in which boys come to understand themselves and how these practices engage their relations with their bodies and with other people. This requires that we understand how boys are constructed as social beings in every day lives.’ (p.46)

The kind of activities Connell (1993, 1995) suggests are required to explain different gendered outcomes have been a strong presence in the gender literature of the past decade. Theorists working in the area of masculinity and schooling, as well as post-structural and feminist post-structural theorists, have been critical of essentialist arguments, and interventions stemming from these arguments (Epstein, Elwood, Hey & Maw, 1998; Jackson, 1998; Cohen, 1998; Mahony, 1998; Mac an Ghaill, 1994; Weedon, 1997). For example, Jackson (1998) examined the way in which arguments around gender education are popularly constructed, and criticises what he terms ‘gender absolutism’, which he sees resulting in entrenched oppositions between men and women:

‘The essentialised purity of the woman as victim (often seen as powerless, oppressed, downtrodden and passive) is defined in relation to the biological fixity of the male perpetrator (often seen as undifferentiatedly powerful, violent and controlling). Instead of a dynamic and relational view of gender that stresses the complex and contradictory relations between diverse forms of masculinity and diverse form of femininity, all men are lumped together in a very deterministic and reductive way.’ (p.83)

Jackson argues these arguments are unhelpful because they lump men together and disempower men (when seen as oppressors) from addressing gender equality.

Epstein et al. (1998) are critical of popular discourses framing the debate about ‘failing boys’, which, broadly embedded in essentialist arguments, do not critically examine masculinity but instead call for a reinstatement of masculine regimes. For example, the ‘poor boys’ discourse, Epstein et al. see as emanating from a movement against feminism, which blames the problems with boys on attacks by assertive women. In the ‘poor boys’ formulations, responsibility for boys' problems lie with teachers, mothers and feminists, who contrive to make boys soft and repress their natural masculinity. Solutions
involve the masculinisation of teaching styles and curriculum content, introducing male mentors to schools, in short, buffering up masculinity without examining how it may be part of `the problem`.

A similar discourse noted by Epstein et al. is that of `boys will be boys`, where the nature of boys is seen as unchanging and unchangeable, and therefore needing to be worked around and catered to; for example, shifting classroom practice to engage boys and using girls to police, teach and civilise boys. Epstein et al. (1998) make the point that, while meeting the needs of students is fundamental to good teaching practice, these discourses are harmful because in some senses, they work to excuse genuinely `bad` behaviour, rather than examining the practices that help establish it. Like other critiques of essentialist discourses, Epstein et al. draw attention to the diversity of outcomes of boys in relation to social class and ethnicity, and also to the literature demonstrating how schools support various kinds of masculinity; diversity tends to negate the idea of an `essential` male.

Similarly to Epstein et al. (1998), Delamont (1999) has attacked what she calls the `discourse of denigration` in Britain and the United States. which is organised around the (faulty) premises that: (1) boys are all failing; and (2) this is the fault of the teaching profession, which has become increasingly feminised and now does not meet the needs of boys. Comparable arguments, with an essentialist flavour have been made in New Zealand (Greer,1998; Roger, 1999). For example, in an article headed “Where have the boys gone?”, Greer questions the feminisation of the teaching curriculum and claims it needs to be understood that boys are essentially different from girls. Rogers (1999) blames the feminisation of teaching, among other things, for the All Blacks recent loss to the French.

Delamont (1999) identified five problems commonly blamed on the `feminisation of teaching`, and critically examined the assumptions underpinning these arguments based on available research. Briefly, the five problems associated with the feminisation of teaching are: there is lack of scholarly/academic role-models for boys; there is a bias in favour of feminism in the curricula; there is a lack of toughness in discipline; there has been a rejection of competition in academic and sporting matters; school and classroom regimes favour females.

These `problems`, Delamont (1999) notes are based on six assumptions for which there is little support in the literature. The first assumption implicit in this discourse is one of `undifferentiated needs of boys`; that is, all boys need more toughness and harsh discipline to succeed. It is clear from Delamont’s (1999) review, and the literature on masculinity reviewed for this paper (see Social Theories following), that there is a range of ways of being `a boy`, and that in some cases, harsh discipline works to mobilise anti-school behaviours and is productive of `macho` masculinity (for example, Connell, 1993; Mac an Ghaill, 1994; Gilbert & Gilbert, 1998).

The second through fifth assumptions relate to `stereotypes` of teachers. The discourse assumes that all women teach in a particular nurturing, progressive and anti-competitive way and that men do not. It also assumes that male teachers are all sports loving, tough and automatically revered as role-models by boys, while women are sports-phobic, weak, and provide no role-models for boys. The discourse also implies that all women teachers are committed feminists in theory and in practice, prefer teaching girls, and value the achievement of girls above that of boys. Again, Delamont’s review of the evidence does not support any of these contentions; research on teaching philosophies show men and women have diverse approaches to pedagogy (see for example, Mac an Ghaill 1994; `Old collectivists`, `New Entrepreneurs` and `Professionals`). Evidence reviewed for the curriculum areas in this paper show boys are more often the subject of teacher attention (both positive and negative), and Delamont (1999) found that there was no evidence to suggest women teachers prefer or value the achievement of girls more than boys. Rather, data consistently show the reverse. Finally, Delamont notes there is little research on men as teachers in schools, and what evidence there is (see Mac an Ghaill, 1994 above) does not suggest that men are better at civilising or motivating the `macho` lad.
In the New Zealand context, Middleton (1992) has discussed the limitations of ‘role-model’ policies. In particular, she notes there is no guarantee that selected role-models will become ‘heroes’ and emulated by pupils, nor that people taken up as role-models by students will necessarily be of the same sex. Much of the evidence we have reviewed in Chapters Four and Ten contradicts Middleton’s latter point. However, in a point also raised by Browne (1995b), she notes that role-models are not always directly encountered, but may be found in stories, and the media. Another important issue is the qualities of people held up as role-models. Clearly, people who are seen to reinforce aggressive, hyper-rational and uncaring attitudes towards others will not be useful to producing well-rounded, emotionally articulate and considerate boys and men (Raphael Reed, 1998). In the late 1990s, it is not just a case of bringing ‘men’ into schools, but quality teachers.

A final assumption underpinning the feminisation of teaching rationale for the underachieving boy, discussed by Delamont (1999), is that there was a golden age of teaching, where there were many male staff, and no problems with boys. Historical examinations of the teaching profession in New Zealand (O’Neill, 1992) show that from the early twentieth century, primary school teaching became the preserve of women, while men generally assumed positions of responsibility. This evidence does not sit well with the eruption of concern about boys in the 1990s, or the evidence that suggests boys achievement has not steadily declined in recent years (Praat, 1999).

Jordon (1995) has also responded to criticisms that boys' misbehaviour in school is the result of them rebelling against a ‘feminine environment’. Jordon (1995, p.77) argues that restraints placed on boys behaviour at primary school; are preferred by both male and female teachers; and then develops an argument which suggests that the preference for conforming and responsible behaviours is supported by powerful and influential males in society at large:

‘The kind of demeanour and self-management that teachers are trying to inculcate in the early school years is the behaviour expected in male-dominated public arena alike: boardrooms, courtrooms and public meetings. Bowles and Gintis have argued that ‘the structure of social relations in education not only inures the student to the discipline of the workplace, but develops the types of personal demeanour, modes of self-presentation, self-image, and social class identifications which are crucial ingredients of job adequacy.’ (1976, p.131)

What this research collectively suggests is that there is no determinate relationship between the gender of the teacher, their teaching style or the likelihood of being a role model for students. It also suggests caution in accepting solutions that view the gender of a teacher as more important than the quality.

Researchers working within social rather than essentialist theories of gender have examined the contributions made by various institutions, including the school, in shaping diverse masculinities and femininities. By and large, studies examining masculinity and femininity focus on one, or a small number of schools or groups of students. The small scale of such research is consistent with a theoretical approach that considers the styles of masculinity and femininity emerging in schools as intimately connected to the specific local cultural context, and a function of the labour intensive process of research required to produce such analyses. A selection of these studies is explored below, to provide examples of this explanatory framework, and show how such research could contribute to the investigation of behaviour in New Zealand schools. However to begin with, the theoretical assumptions underpinning such studies hinted at in the criticisms of Gilbert and Gilbert (1998), Jackson (1998) and Epstein (1998), are discussed to give a grounding in the explanatory frameworks.

11.7 SOCIAL THEORIES OF MASCULINITY AND FEMININITY

Sex-role theory was one of the key explanatory social theories of gender difference through the 1970s and 1980s. Sex-role theory posited largely discrete male and female sex-roles, held to contain
identifiable attributes appropriate to being a male or female (e.g., active versus passive, stoic/rational versus emotional). These attributes and expectations were seen as working to restrict the choices and possibilities of individuals (but more often girls). Sex-roles and sex-role stereotypes were thought to be maintained and unitarily reproduced by institutions, such as the school and family, through for example, sex-typed images in textbooks, and different expectations of males and females. Recommended interventions included checking school resources of such stereotypes, and examining teaching and management practices for instances of sexism (e.g., *Countering Sexism*, Department of Education, 1989). Research focused on identifying and ameliorating the negative effects of such stereotypes on social, psychological, educational and economic development (e.g., Bem, 1976; see policy section this review). While sex-role theory was important in examining and addressing a range of practices, it came under criticism on a number of fronts. Law, Campbell and Schick (1999) summarise the criticisms of this approach:

> 'In short, the critique of sex-role theory claims that it is ahistorical; it assumes that gender is made up of attributes rather than actions; it minimises the extent to which gender relations are based on power and it reinforces 'oppositional assumptions' (Kimmell, 1987: 122). Sex-role theory presumes gender is comprised of two mutually exclusive, internally homogenous categories that stand in a hierarchical relation to each other.' (pp. 23/24)

While the term ‘sex-role stereotypes’, and the expectations organised around the binary masculine/feminine, boy/girl still have popular currency, explanations of gender have become more complex.

For example, Connell’s (1993) analysis of the life stories of two groups of young men interviewed in the mid to late 80s, sought to demonstrate how the institutional processes of education and social power were implicated in the mens’ experiences and outcomes; an analysis Connell locates in ‘the realm of sociology’. Connell’s analysis demonstrates how school and peer group relationships were active in the structuring of masculinities of the two groups of men. For those from the “unrespectable” end of the working class, streaming and disciplinary practices of the school acted as a filter and then ‘the antagonist against which one’s masculinity was cut. For the other group of men, labelled ‘wimps’ and swots’, school was used to win social promotion out of their social class. Differentiation among boys, brought about by streaming, led to alienation of some boys and a antagonistic approach to school; a form of masculinity which ‘proved’ the boys’ personal power and masculinity (based on pride and aggression), but had poor long term outcomes. For the other group of boys, schooling led to credentials and social power, through access to careers and greater opportunities (masculinity based on rationality and responsibility). Connell (1993) notes that some forms of masculinity, for example, those based on sporting prowess, sexual conquest and aggression, may be used to claim sources of power for boys who are labelled failures by the school system. Within the school, antagonistic/macho forms of masculinity, associated with being cool, positioned academic success as effeminate and ‘uncool’. He notes schools themselves may show ambivalence to these masculinities, valuing sporting achievement (and connected poor academic behaviour) as much as academic achievement.

While Connell (1993) acknowledges that school is probably not the key influence in the formation of masculinity of most men, he regards it as a powerful influence, and strategic ‘in the sense that the education system is the setting where an open debate about the democratisation of gender relations is most likely to happen and can gain some purchase on practice’ (p.101). Given that his work, and those of others, cites the mainstream curriculum and school practices in the formation of masculinities, Connell suggests these are areas that need to be examined, rather than add-on programmes, to address issues of masculinity. Connell suggests two starting points. First, providing a broad base of information to pupils about sexuality and gender to expand their horizons (preferences, abuse, gender
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patterns across the world), and second, providing a sense that examining the issues is leading somewhere. He notes that many men, when confronted with facts of gender inequality, and unable personally to effect change, feel guilty and turn away from the issues.

Walker (1993) used a theory of ‘inter-cultural articulation’ to examine the relationships between four groups of (working class) boys and their (mainly middle-class) teachers in an urban ‘disadvantaged’ school in Australia. Each group had a repertoire of behaviour and social practices (a culture) that articulated (related) in different ways with other groups. For example ‘the footballers’, a mainly Anglo-Australian group oriented to sport, articulated physically and symbolically with a group called ‘the three friends,’ by oppressive behaviour oriented around sexuality and gender. ‘The three friends’ were widely regarded as effeminate by other groups. With ‘the Greeks’, a second generation group of Greek Australians, the footballers articulated through arrogant and racist behaviour. While there were differences between the groups of boys in the way they related to each other, a major theme of the research was the cultural divergence between the teachers and students. Walker’s (1993) theory of culture and inter-cultural articulation explains how this divergence worked between students and teachers, while the unfixed theorisation of culture acknowledges the different ways each peer group responded to teachers, and the school curriculum.

‘Culture is not simply inherited, static and fixed; it is learned, dynamic and open to change. A basic aim of the teachers’ job was to persuade people to adopt the role of learner of another culture, to initiate them into its practices, especially its symbolic practices (language etc). This was perceived on both sides as a form of work: schoolwork (Woods, 1984), in which social class is an important cultural dimension.’ (p.129)

Walker’s (1993) examination of teachers who got on with, and were successful in, teaching students found students regarded these teachers as genuinely interested in them. The understanding of the students’ multiple cultures and interests meant the teacher’s “inter-cultural articulation was penetrating and substantial and conducted on the basis of his first learning their language, something he was able to do because of their respect for his sincerity and ‘caring’ about them” (p.144).

Much of the more recent classroom-based and school culture research investigating gender issues has examined the many ways in which girls and boys ‘practice/do’ masculinity and femininity at school (Mac an Ghaill, 1994; Gilbert & Gilbert, 1998; Skelton, 1996; Town, 1999). Drawing on social constructionist, post-structural, recent feminist and queer theories (Foucault, 1980; Weedon 1987; Henriques et al. 1984), and ethnographic methodologies, this research supports the view that there is not only one way of being masculine and feminine enacted in schools.

Social Constructionism

There is no single feature that describes social constructionism. Rather, social constructionist approaches have been depicted as sharing a family resemblance (Burr, 1995). Burr offers four key assumptions, one or more of which could be shared by perspectives recognised as social constructionist. The first is “a critical stance towards taken-for-granted knowledge” (p.3). Knowledge is assumed to be a social product, rather than an idea or truth that is permanently fixed. For example, different versions of masculinity and femininity are viewed as socially produced, rather than linked in a determinate way to biology (Law, Campbell & Schick, 1999). In short, the way we define or conceptualise the world is reliant on the categories and meanings available through our language — these tools are not ones we can ‘step outside of’ in order to ‘objectively’ survey the world. Thus social constructionism calls us to question our assumptions and knowledges about what we take the world to be. The second assumption is that the concepts and understandings we have are specific to our culture and time. For example, in the policy section of this review, we see different curricula put in place in
different periods of time, according to the expectations of males and females prevalent in the era. These assumptions suggest that understandings are seen as products of a specific historical and cultural milieu, and are not considered fixed or true for all time and peoples.

Third, knowledge is assumed to be the product of interactions between people in their daily lives. People are seen as constructing their shared accounts of the world when they interact. Knowledge is not the result of scientific observation of the “real” world, but rather is a product of shared meanings constructed through social processes. Finally, different knowledges are assumed to allow for, or permit certain actions. For example, prior to the 1990s, ethnicity questions in the New Zealand census were informed by a knowledge of identity based on ‘race’. Thus, ethnicity was established on the basis of how much blood one had from a particular ‘race’. In the 1990s, ethnicity questions were informed by a knowledge of identity based on culture. Ethnicity was established on the basis of cultural affiliation and self perception. These changes allowed people to identify in different ways. Changes in the knowledges informing census classification led to fluctuations in the number of “Māori” and other groups in New Zealand and have had important consequences for a range of health and social statistics (Boddington, 1998). Thus, constructions are seen to permit or constrain social action. Potter (1996a) adds a fifth, and important, general feature of social constructionist perspectives implicit in all the above assumptions, that is, a concern with discourse as the central organising principle of construction.

**Post-structuralism**

Post-structuralist theories share the assumptions of social constructionism. They explicitly theorise the role of discourse and power in constituting knowledge and subjectivity (our sense of ourselves/identity). With respect to gender, several masculine and feminine positions are available, which are taken up or resisted by students in various learning and social contexts. These various positions (ways of being masculine and feminine), are embedded in broader understandings of gender — called ‘discourses’ in post-structural parlance. For example, conservative discourses of gender offer males the positions of breadwinner, head of the family and dominance in the public sphere, while females are offered positions which relate to the domestic sphere of house-keeping and child rearing; in liberal discourses of gender, males and females are positioned as equal, both entitled to participate in the labour force or in child care (Jones et al. 1995). Different gendered positions have implications for how students engage with each other, and with their learning environments.

Discourses and the positions of discourses, are not just understandings and labels randomly chosen by individuals or attributed to them. Rather, individuals “actively take up as their own the discourses through which they are shaped” (Davies & Banks, 1992, p.3). In addition, discourses are not just seen as existing in words or floating around the ether. They are embodied in social and institutional practices. For example, curriculum policies of the 1940s in New Zealand which recommended girls but not boys participated in classes teaching skills for the home and the family is one instance of an institutionalised discourse of gender — in this case the conservative discourse discussed above. Girls, but not boys were positioned as ‘home-makers’ in this discourse. This is an example of how policies and practices can be seen as actively contributing to the gendering of subjects (Gilbert & Gilbert, 1998). In addition, at any one time, a person can position themselves and be positioned by a number of discourses — thus the self is not presumed to be unitary or coherent, but potentially a site of conflict (Weedon, 1987). For (a simplistic) example, a woman may be positioned at the intersection of discourses which prescribe what it means to be a ‘mother’ and an ‘employee’, which contradict each other in their requirements for living out these positions successfully: a ‘good mother’ stays at home to look after her children, while a ‘good employee’ puts in the extra hours to get the job done. Davies and Banks (1992) show how children construct themselves within available gender discourses (masculine rationale dominant/feminine caring and nice), and manage the pressure from peers when they take up
positions which move beyond what is prescribed (for example, non-macho boys using big boys as defenders).

Along with a theory of difference, post-structural and feminist-post-structural theories offer an account of the way power is implied in social practice. Discourses are seen to vary in the power they offer students. Within these perspectives, power is not seen as universally repressive, something that is always held by some and imposed upon others (c.f. patriarchal power in radical feminism). Rather, power is seen as enabling and constraining in the positions it offers (Foucault, 1985; Weedon, 1987; Mac an Ghaill, 1994). For example, while streaming practices of schools contribute to the constitution of an oppositional and aggressive masculinity among some boys, ultimately leading them to poorer employment prospects, the aggressive masculinity of these boys, positions them as intimidating and thus powerful to other male and female students.

While research from this perspective demonstrates the diversity in masculine and feminine positions, some writers continue to use the concept of ‘hegemonic masculinity’, to refer to a dominant version of masculinity. Hegemony is a term borrowed from Marxist traditions, which, when used in gender explanations, refers to the way in which one specific version of masculinity comes to be generally viewed as ‘natural’ and ‘right’, despite its potentially oppressive or damaging effects.

Connell (1996) notes that the hegemonic form of masculinity need not be the most common form. However, it is visible (think, for example, of the All Blacks in the New Zealand context). Hegemony “signifies a position of cultural authority and leadership, not total dominance; other forms of masculinity persist alongside” (Connell, 1996, p.209). Other forms of masculinity that are less honoured (or actively dishonoured) include, for example, homosexual masculinities and the masculinities of ethnic minorities. Femininity tends to be defined in contradiction to the hegemonic form of masculinity.

In keeping with anti-essentialist arguments, hegemonic masculinity is not seen as fixed, but as something that is continually won, proven or reinforced through a range of social practices; it is however ‘consented’ to, in that it is the most honoured version of masculinity within a specific cultural and historical context. One of the major points of difference with hegemony theory and more post-structural formulations is the theorised role of power in maintaining the social order:

‘Instead of power being imposed by ruling classes, as the structuralists maintain, or consented to, as the hegemony theorists assert, it is omnipresent in every circumstance and action as cultural knowledges and habits.’

(Star, 1999, p.40)

However, the term ‘hegemonic masculinity’ is retained in some post-structural accounts to refer to the most culturally dominant form of masculinity among the range of masculinities extant in any given context (Town, 1999).

The problematic status of dominant or hegemonic masculinities in schools, and the consequent positioning of femininities and other masculinities has been an issue receiving critical attention in recent years (Jordon, 1995; Mac an Ghaill, 1994; Haywood & Mac an Ghaill, 1996; Skelton, 1996; Eder, Evans & Parker 1995). Studies using the concept of hegemonic masculinity and/or post-structural perspectives have addressed themselves to all levels of compulsory schooling.

### 11.7.1 Gender Construction in Primary Schools

In the primary sector, Skelton (1996) examined how a masculinity based on aggression, competition and intimidation, reflective of the dominant form of masculinity in the school’s community, was reconstituted in one English primary school. Concerns for teacher safety meant the school was
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der Differences

fortified’ against attack. While teachers attempted to establish within the school behavioural expectations of students that were different to the dominant masculinity within the community, stereotypical domineering/passive images of masculinity/femininity within the school, and teachers ‘stand over’ disciplinary strategies ultimately reconstituted, within the school, the dominant aggressive form of masculinity that was prevalent in the community.

Starting from a position that in order to uncover how inequality is established at primary school, one needs to shift attention from what happens to girls to what happens to boys, Jordon (1995) used threads of post-structuralist theory to make sense of her teaching experiences of ‘fighting boys’ and their relationship to ‘warrior’ and ‘superhero’ discourses, which position other boys and girls as subordinate. Jordon argued that by the time children have reached primary school, they are established and committed to their gender identity as boy or girl, but are still learning sex-appropriate behaviours. Because children are already invested in their gender identities, she argues that there is no point in treating children the same, as if gender was not significant (non-sexism). Rather, educators should aim to redefine and make acceptable for children masculine positions that do not demand the derogation of some boys and all girls.

Jordon (1995) noted that it is not all boys who are disruptive when they reach school, but rather a small group of boys. These boys find conforming to classroom practices of sitting still or concentrating for long spells, antagonistic to the comparative freedom of movement and choice in pre-school activities. She notes that it is these boys, and their engagement with and contestation in ‘warrior’ and ‘superhero’ discourses, who appropriate ‘superhero’ positions in schools, leaving a subordinate position for conforming boys or those who are unsuccessful in competing for ‘superhero’ status. Subordinated boys in turn define their identity as boys in terms of ‘not being girls’. These definitions ultimately result in the rejection and disparagement of things feminine, and the harassment of girls.

While many analysts in gender relations recognise the different power relations between different groups of boys, and between boys and girls, the elision of femininity/weakness and masculine/strength is a more common finding than the separate processes of: (1) becoming a superhero or weakling; (2) with this then resulting in an alternative definition of masculinity as ‘not feminine’ offered by Jordon (1995). For example, derisive labels for ‘weaker’ boys often insinuate femininity eg, girly swot. It is not a case of either/or, as clearly both being a ‘hero’ and ‘not being feminine’ work to constitute positions of masculinity.

Jordon (1995) suggests interventions could involve redefining what it means to be a ‘hero’ or ‘warrior’ for boys, in ways that make violence and fighting the subordinate or ‘non-heroic’ position, but continue to recognise the salience of the ‘superhero’, ‘warrior’ stories/discourses. As examples, she offers those (men) compelled by community spirit to fight fires, or who are committed to working for social justice. Through redefining positions of masculinity and femininity, it is Jordon’s hope that the narrowing of options brought about by current positions could be modified, and make school more tolerable for girls.

Eder et al. (1995), using a theoretical framework informed by an interpretative approach to peer group construction, and a dialectic approach to discourse and power (constructionist in flavour), studied institutional and language-based gender-related practices in a middle school (NZ years 7-9) in the United States Midwest. Using a participant-observation methodology, fifteen peer groups representative of various year levels and positions within the peer hierarchy were studied over three years, mostly in extra-curricular activities and in lunch times. The study found a trend towards increasing differentiation of peer groups as children moved from the 6th to the 8th grade, with the popularity or ranking of groups being based around involvement in, or association with, two activities: football and cheerleading. For boys in the school, and particularly those in the football team, an
aggressive, competitive, heterosexual and ‘in control’ masculinity was reinforced by the school authority in the context of sport, and was policed in the informal culture of boys through insulting exchanges geared to proving continually the toughness, and therefore the masculinity, of those involved. This pattern of insulting and aggressive behaviour prevailed across social class boundaries and within social groups, extending to girls as well as boys. In explaining the maintenance of toughness among male students through insulting exchanges the authors write:

‘Since the expected response is another insult rather than a denial or a challenge to the legitimacy of the first insult, this common routine offers boys few opportunities to challenge the content of insults. While a possible option to being called a ‘fag’ or a ‘wimp’ is to reply ‘So what?’ or ‘Who cares?’ these responses were extremely rare. In other words, they are not challenging the importance of being competitive, unemotional, aggressive and heterosexual as they defend their own personal characters from charges of failing to measure up to these ideals.’
(p.78)

In contrast to boys, popularity for girls was not connected with participation in girls sports but through inclusion in the cheerleading squad and their attractiveness. School practices through which girls acquired status tended to focus attention on how girls looked (cheer leading, baton throwing, proms) forcing an objectification of girls, who came to be defined externally according to image rather than any other attributes. As well as defining the value of women in terms of looks only, the authors note that ideals of beauty exclude many women (overweight women, women of colour, older women). Through gossip and insulting exchanges both between and within genders, girls received messages not only about their looks, but about their sexuality. Active sexuality or even independent behaviour could earn girls the label of slut, whore or dog, while appearing too innocent was also a source of ridicule. The authors identify the objectification of girls as the primary process maintaining gender inequality, with both boys and girls focusing their attention on the external characteristics of girls. Boys additionally perceived their female peers as passive sexual objects rather than as sexual actors in their own right.

Based on the results of their own and previous research, Eder et al. (1995) offer some starting points for intervention. At a structural level, they question the ethics of schools’ practices that honour a masculinity associated with violent competition (football), and femininity with narrow definitions of external beauty. They suggest supporting and valuing diverse sports and activities that could maintain competition without the link to ruthless aggression, and supporting events and activities that allow girls to be valued in ways other than their looks. Eder et al. (1995) also suggest there need to be forums for girls and boys to discuss how sexism and limited views of femininity and masculinity directly affect their lives. The authors take language practices not only as a site of constraint, but also of transformation in enabling girls (and boys) to deal with (sexist) attacks through verbal strategies (eg, humour), and redefining girls’ sexuality in positive ways. They also make a case for staff to take complaints of sexual harassment seriously, and suggest providing sexual relationship models for boys that offer alternatives to the prevalent competition/conquest model. Finally, they suggest that boys and girls need work and play opportunities that allow them to relate to each other as equal, whole people (eg, cooperative learning, clubs and non-athletic activities).

### 11.7.2 Gender Construction in Secondary School

Mac an Ghaill (1994) provides one of the most comprehensive (and commonly cited) studies of masculinity, making in a secondary school context in recent years. Mac an Ghaill’s (1994) research demonstrates the huge complexity and contradictory nature of identity formation in the secondary school, in relation to the wider social and political context. The value and relevance of this research lie both in its sophisticated explanatory framework, its bringing to light of the way in which masculinity
is policed, and polices educational and social experience, and in its example of how masculinity and femininity in relation to other key issues including ethnicity, class, disability could be studied in New Zealand contexts. For these reasons, we have given Mac an Ghaill’s work a lot of weight in this review.

Drawing on evidence from a three year ethnographic study (1990-1992), and earlier research of gay students’ educational experiences, Mac an Ghaill demonstrates how the school, family networks, changing labour markets, peer group practices and local and state regulation are implicated in/constitutive of the multiple masculinities of (mainly) working class boys.

With respect to the role of schools in producing masculinity and femininity, Mac an Ghaill (1994) argues that:

'school microcultures of management, teachers and students are key infrastructural mechanisms through which masculinities and femininities are mediated and lived out. A dominant concern is the critical examination of the way in which dominant definitions of masculinity are affirmed within schools, where ideologies, discourses, representations and material practices systematically privilege boys and men.' (p.4)

For example, Mac an Ghaill shows how the practices of four different peer groups of boys were supported and constrained by the school policies (which were, in turn, a response to the regulatory environment), teacher responses and family networks. Briefly, these groups (and Mac an Ghaill’s shorthand summary of them), identified by their differential relationships with school and developing masculine identities, were the: Macho Lads ‘survival against authoritarianism’; Academic Achievers ‘ladders of social mobility’; New Enterprisers ‘making something of your life’; Real Englishmen ‘looking for real experience’ (not found at school). The first three of these peer groups were working class and the last middle-class. The significance of their differential relationship with school is the wide, intra-class variation in response to the same secondary school.

Mac an Ghaill (1994) found peer-group masculine identities were “developed in response to the schools differentiated forms of authority” (p.57). The Macho Lads' experience of school as a system of hostile authoritarianism and meaningless demands was mediated through their location in the lowest set of the school, where social relations were characterised by domination, alienation and infantilism. The primary teacher function for these boys was that of policing them. Mac an Ghaill also notes that the Macho Lads were pivotal in associating the academic/non-academic couplet with a feminine/masculine couplet, which was pervasive throughout the school. In contrast to the Macho Lads, the positive school support, received both materially and in terms of high expectations and esteem, helped the group of boys referred to as the ‘Academic Achievers’ to develop an “institutionally confident student masculinity that was highly valued by the teachers” (p.60) Interestingly, while finding creative ways (eg, humour) to deal with being positioned as effeminate through their association with the arts by both students and male teachers, these boys maintained essentialist gender divisions within subjects. For example in English, the Academic Achievers maintained they themselves were oriented to becoming ‘experts’ in the subject, while girls were naturally interested in feminine writers and ‘emotional stuff’.

In response to changing funding arrangements (eg, business sponsorship of the technology department) as schools joined the ‘education market’, the school curriculum at the research school became increasingly geared to vocation preparation, with an attending restratification of subject status. In contrast to the traditional academic/vocational divide, business, commerce and technology — subjects in which boys predominated — became the new high status subjects. For one group of working class boys, the New Entrepreneurs, this resulted in masculinity re-negotiation, focused on
rationality, instrumentalism and careerism, as the re-stratification of subjects offered avenues of social mobility. By and large, these students affirmed the authority of, and were supported by, the teachers, accepting the exchange of student co-operation for qualifications. This affirmation was in contrast to the orientation of a middle-class peer group, referred to as the Real Englishman. The Real Englishmen’s ambivalence to the curriculum, and their power-contests with teachers resulted from their self-positioning as the younger generation of a cultural elite, who expected to be able to negotiate with teachers. Mac an Ghaill asserts that their disdain of hard workers as ‘sloggers’ accompanied the assumption that intellectual talent was naturally inscribed within the peer group, who actively worked toward a public representation of ‘effortless achievement’.

Mac an Ghaill’s (1994) examination of the key commonalities constituting heterosexual male students’ subjectivities revealed the elements of ‘compulsory heterosexuality, misogyny and homophobia’ (p.90) which were differentially acted out, depending on the context. Sex-talk, including boasting about performance, objectifying females, denigration of gays and the feminine, was a key way in which males publicly proved their masculinities to their peer groups. However, Mac an Ghaill also found boys privately often reflected on the difficulty in talking about feelings with each other, and their resulting isolation and loneliness. Contradictory practices of masculinity, such as wanting girls, feeling inadequate to have relationships with them, putting mates first, expecting girls to ‘know the score’, and sexual relations of harassment for girls ‘other’ than girlfriends, resulted in ambivalent treatment of girls. Significantly, Mac an Ghaill writes:

‘Their individual lack of confidence, manifested in highly defensive talk among themselves about young women, served to hide from the young men the gendered and sexual cultural forms of power ascribed to them as heterosexual males.’
(p.102)

Mac an Ghaill’s (1994) examination of the way boys’ masculinities were experienced by girls in the school offered particular insights into the way dominant versions of masculinity policed and prescribed the positions of female students. For example, differential participation of girls in the new vocational curriculum was explained by teachers in terms of narrow gender assumptions. Girls, the teachers explained, did not participate in the new high-status subjects (computing, technology), because of their lack of interest; working-class young women were encouraged into low-level people/care oriented courses, with the expectation that these courses would best fit them for their likely future outcomes. Girls were highly aware of and challenged these assumptions, and offered accounts that specified masculine exclusionary practices (eg, ‘the boys took over’) as reasons for their participation patterns. Using girls and femininity to police boys in the classroom was another practice girls criticised. This operated differently in the high and low sets. In maths and science, some teachers motivated boys by comparing their performances unfavourably to the girls, while in the lower sets, boys’ behaviour was disciplined by attributing boys with feminine characteristics.

Mac an Ghaill (1994) also demonstrated how male teachers’ assumptions of how adolescent boys and girls behaved resulted in other problems for girls. For example, the assumption that boys behaved worse than girls resulted in girls’ bad behaviour being seen as individually deviant and ‘non-feminine’, which did not challenge the teachers’ ideas of ‘adolescent femininity’. Consequently, a disproportionate amount of school resources were allocated to boys who were positioned as a threat to the school. Another significant problem for the girls was that their complaints of harassment were not taken seriously by teachers, who worked on ‘the boys were having a laugh’ principle. The regulation of feminine positions occurred through this harassment, with terms such as ‘slag’ policing girls sexuality, and forcing conformity to expected sexual divisions, and heterosexual arrangements. The problem of teachers not taking such harassment seriously has been identified in other research investigating sexual harassment in the United States (Stein, 1996), Canada (Larkin, 1994) and Australia (Gilbert & Gilbert, 1998). As Mac an Ghaill notes: “Male teachers, in naturalizing young
men’s behaviour, failed to acknowledge the institutional power invested in masculinity with the accompanying social positioning of femininity” (p.129). More generally, the depoliticised way (ignoring sexism, racism and homophobia) in which bullying was dealt with at schools was criticised by Mac an Ghaill, who cites research saying that not only physical bullying, but verbal bullying is often a key part in a child’s decision to commit suicide.

The compulsory heterosexuality, misogyny and homophobia characteristic of dominant versions of masculinity in schools was problematic for gay students. Mac an Ghaill summarised the effect of the absence of gay experiences, lifestyles and histories in schools — except for the negative connection with AIDS — noted by gay participants in his study:

‘For the students, this silence — reflecting that in the wider society — pervaded the whole of the formal curriculum, serving to reproduce and legitimate dominant heterosexual hierarchies. From this perspective, heterosexuality was presented as natural, normal and universal, simply because there were no alternative ways of being (Egerton, 1986). The students emphasised the personal isolation, confusion, marginalisation and alienation this engendered. Most significantly, without a positive reference group, they tended to internalise ambivalent negative messages about themselves as gay men.’ (p.161)

The frequent conflation of assumed gay behaviour with femininity to police sexuality and masculinity, like the use of the word ‘poof’, was the cause of much distress to students throughout their school career, and a significant point of derision as they became aware of their sexuality. The pressure to conform to accepted forms of masculinity, and the consequences of not doing so, were omnipresent in the school. For the students:

‘The moral order was policed by visible and invisible processes of institutional and self surveillance that were pervasive throughout their schools and colleges. The sexual and gender imperatives of performing like a man found expression in the official and hidden curriculum — in classrooms, assemblies, counselling, cloakrooms, toilets, playgrounds and leisure activities.’ (p.163).

However, like some men and young women in the study, young gay men found creative ways of dealing with, and challenging, institutionalised heterosexuality and were concerned not to be positioned as mere victims of problems.

The implications of Mac an Ghaill’s research are multiple. His research identifies the importance of using explanatory frameworks that acknowledge multiple forms of oppression in examining the experiences of students. Listening to what students have to say about their experiences of school helps elucidate the way schooling itself is implicated in perpetuating assymetrical power relationships. Mac an Ghaill further suggests locally focused studies, that are able to “hold onto the concrete material conditions of the research participants, in which social and discursive practices are played out” (p.172), enable the researcher to counter the abstractness that theorising can lead to. With respect to school and the school environment, this research implicitly supports the importance of a constructivist approach to students’ learning, which emphasises the centrality of students’ own experiences, and cultural capital, in constructing knowledge. This includes recognising students knowledge, but also the way that students’ identities are negotiated and invested in their engagement with schooling. With respect to identity formation, Mac an Ghaill (1994, p.179) notes:

‘schools can be seen as crucial cultural sites in which material, ideological and discursive resources serve to affirm hegemonic masculinity, while producing a range of masculine subject positions that young men come to inhabit. Most importantly, the students illustrate above that misogyny, homophobia, heterosexism
and racism are not passively inherited in a unitary or total way. Located within local gender and sexual peer group cultures, they actively select from a range of socially oppressive constructs, and in this process make their own individual and collective meanings.

Aside from addressing the gendered power relations implicit in school policies, practices and ideologies, Mac an Ghaill (1994), in collaboration with the gay students who participated in his research offered, an agenda for sex/sexuality education that could be beneficial for all students. This agenda seeks to move beyond the facts of biological reproduction, anti-racist and anti-sexist education. It recommends a student-centred pedagogy, with a focus on adolescent sexuality development, an understanding of power relations extant between and within social groups, and a discussion-based programme, including issues such as feelings and emotional growth.

One of the few New Zealand studies using the notion of hegemonic masculinity located for this review was conducted by Rout (1992) in two New Zealand secondary schools. Rout (1992) used an ethnographic approach to investigate how (Pakeha) boys in two schools (one co-educational and one single-sex) learned to be and see themselves as masculine, and also, how boys reproduced their own male power and subordination of girls and women. He found that ‘being staunch’ was the dominant (hegemonic) masculine ideal at both schools: at the single-sex school this was represented by some members of the first XV, and in the co-educational school by a group of ‘surfies’ and ‘metalers’. Rout reported that:

‘For these three groups, being ‘staunch’ meant being in control, being tough, being able to ‘handle’ anything — and winning. It was their way of gaining respect and popularity from others (male and female) and respect for themselves.’ (p.171)

While these three groups represented the ‘masculine’ ideal at their schools, Rout found that a large majority of boys at both schools also related to each other in staunch ways, mainly through verbal and physical hassling. Rout theorised physical and verbal hassling as an enacted form of violence because it involved a perpetrator and a subject of abuse:

‘Hassling was the means by which violence was justified as ‘normal’ male behaviour, because it was accepted and even expected by both the perpetrators and the victims.’ (p.173)

Like Mac an Ghaill (1994) and Eder et al. (1995), Rout found that proving masculinity meant not only hassling other boys, but also denigrating and harassing girls and women.

‘ “You’re throwing like a girl” or “What are yah – queer[gay]?” are, for males, two very powerful and common insults that attack the core of their masculine and personal being. In other words, by thinking of themselves as superior to girls, the boys could not only put girls down but at the same time boost their own personal and public status as males. Hassling girls was always of a sexual nature, and girls, simply because of their sex, were always the victims.’ (p.174)

Girls and women were objectified and rated by boys according to their sexual attractiveness and their ‘reputation.’ A boy could get hassled by his mates for going with the wrong women when too drunk at a party, for example:

Bert: .... like when you make a bit of a mistake, cut your rocks together and fleece you, but otherwise they sort of hassle you about it. If they’re nice, then you don’t abuse them too much. You happen to get unlucky if you get a bit too drunk. Hassle them then.
Bill: You get a bit too drunk so you go after the wrong sort of girl? [yeah]

What’s the wrong sort of girl?

Bert: Oh, I don’t know. Looks like a dog, ugly [Ugly?] Yeah. (p.178)

Like the findings of Mac an Ghaill (1994) in Britain and Eder et al. (1995) in the United States, the dominant version of masculinity in two secondary schools in New Zealand was constituted by practices of denigration of females and the feminine, and proving oneself to be tough and ‘in control’ to peers. The relationship of dominant versions of masculinity to femininity and (hetero)sexuality is taken up in the following section looking at the experiences of gay students.

11.7.3 Heterosexism and Heteronormativity in Schools

A key finding of Mac an Ghaill’s (1994) research is the relationship between sexuality and masculinity in producing common forms of masculinity. Studies embedded in post-structural and psychological/sociological and anthropological traditions have pointed to the ways in which the policing of masculinity involves the derogation of femininity, and silencing of sexualities other than heterosexuality (Epstein, 1996; Eder et al, 1995; Jordon, 1995; Larkin, 1994; Stein, 1995).

For example, in a response to popular criticisms that treat children as incapable of engaging with lessons in homosexuality and bisexuality (marginalised masculinities), Epstein (1996), showed how the imagined futures, games, rhymes and stories of primary age girls and boys inserted them into discourses of (hetero)sexuality. In an interview-and-observation based study, Epstein found that while the behaviour of students was not sexually aware or active, the positions taken up by students were divided along gender-specific/typed boundaries. Rather than seeing these forms of play and interaction as students passively taking on the predicted ‘sex-role stereotypes’ Epstein argued it involved the students in ‘a more active process of investment in heterosexual forms of relating’ (p.4). Epstein argued that sexuality was not absent from schools, as argued by those against introducing other forms of sexuality to youngsters, but rather was pervasive in school cultures.

In an article considering the school culture in relation to heterosexism and homophobia and sexism, Friend (1998) elucidates why the spectre of disrupting the silence on sexualities considered ‘other’ in schools such as lesbians, gays, bisexuals and transgendered individuals is problematic. Defining ‘heterosexism’ as ‘the assumption that everyone is heterosexual, or if not, should be’ (p.139), Friend discusses how the interrelated power processes of systematic exclusion and systematic inclusion, maintain the heterosexist assumption.

While systematic exclusion refers to the institutional silence around homosexuality, which effectively marginalises those of gay and lesbian identity, systematic inclusion involves the linking of homosexuality with pathology, sexual behaviour and/or danger. For example, when ‘official’ mentions of homosexuality arise in the context of safe sex and HIV/AIDS, being gay or lesbian is pathologised. When homosexuality is ‘added on’ to health education curriculum, homosexuality is presented as something outside or ‘other’ to discussions of topics such as family, love and relationships, which all take heterosexuality as their basis. Friend (1998) also notes the ‘pervasive, persistent and pernicious’ equations of homosexuality with sexual behaviour and sexual deviance. While sex is currently seen as personal and private, and an appropriate topic for children only as they become more mature, the narrow association of homosexuality with sex means discussions of homosexuality may be framed as inappropriate for children and in need of parental permission.

Collectively, the continued negative constructions of homosexuality silence criticism of the violence, harassment and homophobia experienced by gay, lesbian, bisexual and transgendered people, and preclude discussion of how heterosexism and homophobia contribute to the policing of masculinity, femininity and sexuality more generally.
To counter hegemonic practices, Friend recommends a whole school approach aimed at inclusivity in policies, practices, pedagogies, resources and philosophies:

‘school culture must frame inclusiveness as a moral career for all participants. In this way combating sexism is seen as good for boys as well as for girls.
Dismantling racism is understood as important for Whites as well as for people of colour. Coming out against homophobia is framed as enhancing the lives of people of all sexual orientation.’ (p.158)

In the New Zealand context, Town (1998, 1999) focused on the way the enacted and official school curriculum appeared to support and reinforce a variety of hegemonic masculine practices. These created restricted and normalised representations of heterosexuality and masculinity for ten young gay men. Town identified three ‘heteronormative’ practices implicated in the maintenance of a normalised ‘heroic’ masculinity.

The first of the key practices was the silence about sexualities other than heterosexuality in the school curriculum.

‘The school curriculum operated to reinforce the binaries of heterosexual, masculine, normal, acceptable; and gay, feminine, abnormal, unacceptable.’ (p.139).

These silences were experienced as marginalisation by the students, contributing to their feelings of disease. A second practice causing distress to the students dealing with their emerging sexuality was the teaching about HIV/AIDS in the Health Curriculum within a ‘minoritising discourse’. HIV/AIDS was aligned with homosexuality (minority), rather than being seen as a result of sexual practices, with the result that being gay was pathologised. For example, one student articulated his distress as follows:

‘I shut it (homosexuality) out because I didn’t know what I was going to go through, what was going to become of me, was I going to get AIDS when I was twenty.’

(Town, 1998, p.124)

The third heteronormative practice involved the policing of gender and sexuality in the peer group. All of the students in the study experienced and/or were a witness to verbal abuse pertaining to homosexuality in their schools; often this abuse was attended by threats of physical violence. The list of abusive terms, like those found in other research (eg, Eder et al. 1995; Mac an Ghaill, 1994) was structured around the binary of strong male inclusion and weak male/female exclusion. It was extended not just to those suspected of being gay, but also to students who were different in other respects.

Town argues that it is the internalisation of the homophobia experienced by young gays that translates into depression, low self-esteem, and suicide. He concludes with the following suggestion for action:

‘In order to rethink (homo)sexuality and to seriously address the wellbeing of young men in schools, we need to name, deconstruct and fracture the practices that support and re-invent heteronormativity. In doing so, we begin to expand the discourses surrounding young men in schools and open up new possibilities for being male.’ (p.149)

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6 Town (1999, p.136) uses Warner’s (1993, p.xxii) definition of heteronormativity that states:

“The normalising processes which support heterosexuality as the elemental form of human association, as the very model of inter-gender relation, as the indivisible basis of all community, and as the means of reproduction without which society wouldn’t exist”.
Further insights into the positions offered to gay and to lesbian students in their experiences of school in New Zealand are found in Quinlivan and Town (1999). This research is discussed in Chapter Nine: the reader is referred to that chapter.

**SUMMARY OF SCHOOL-BASED MASCULINITY AND FEMININITY RESEARCH**

What this research collectively indicates is that schools and students, and the communities in which they are embedded, are implicated in producing a range of masculinities and femininities. How these positions are articulated/acted out is generally specific to the local context, although similarities emerge across studies. For example, a position of dominant or hegemonic masculinity is often bolstered by key competitive sports, and defined by social practices that denigrate femininity (that is, sexism/sexual harassment) and subordinate masculinities (for example, homophobia). In a nutshell, different versions or positions of masculinity are defined in (hierarchical) relation to each other, and intersect with discourses that define acceptable and unacceptable sexuality.

From an early age, children position themselves, and are positioned by others, in relation to acceptable ideals of masculinity and femininity. For boys, ‘doing’ masculinity involves taking up positions that can alienate them from close relationships, put them in physical danger, and cause problems for others in their environment; but nevertheless ensure their status in the peer group as ‘real men’.

The literature shows schools (explicitly or implicitly) may contribute to the production of various forms of masculinity and femininity and their attending behaviours through:

- the use of disciplinary practices based on intimidating/stand over power relationships and that rely on the shaming of boys by comparing them (unfavourably) with girls;
- channelling students into ‘gender-appropriate’ subjects;
- providing curriculum content (eg, in health) that honours some masculine and feminine identities and silences others;
- supporting some school activities (eg, sports) that are associated with aggressive forms of masculinity while ignoring others;
- failing to take sexual harassment and bullying (including its source) seriously.

The research reviewed implicitly links the performance of some masculinities to boys’ negative behaviour. Kenway and Fitzclarence (1997) have used masculinity theories to theorise explicitly the relationship between masculinity and violence.

**11.8 MASCULINITY AND VIOLENCE**

The themes of masculinity research are drawn together by Kenway and Fitzclarence (1997), in a synthesis of the literature and its relationship to violence. Their argument is complex, and reduced here. Reviewing the statistical profile of offenders and victims of violence reported in Australia by the National Committee on Violence (1990), Kenway and Fitzclarence note how violence is both committed and experienced in patterns organised around masculinity, marginality, sexuality, familiarity or intimacy and age. They suggest that to understand violence, explanations must factor in such asymmetrical power relationships implied in the statistics (eg, gender, disadvantage). They also suggest that the patterned nature of violence shows violence is not merely an occasional aberration, or understood simply as deviance or deficiency in the personality or particular family or culture of the perpetrator or victim, although they may be relevant.

Kenway and Fitzclarence (1997) discuss the role of masculinities, and particularly hegemonic masculinity, in the articulation of violence. Following Connell (1995), masculinity is understood as ‘a
project’, something that is fluid and fragile and which needs to be constantly proven, with particular forms of dominant or hegemonic masculinity played out in ways specific to a historical and cultural milieux. Hegemonic masculinity is enacted in (power) relation(s) to subordinate (eg, gay), marginalised (eg, Māori and lower social class) and complicit masculinities. The final masculinity may not live up to the rigorous standards of ‘hegemonic masculinity’, but draws inspiration from it and reaps the ‘patriarchal dividend’ of it. Kenway and Fitzclarence write (1997, p.120):

‘If we consider the ongoing project of sustaining male power and masculine identity, and the individual and group performances, repressions, oppressions and contests this may require, then we can see why violence is mobilised.’

At this point in time hegemonic masculinity is constituted around a dichotomy which distances masculinity from femininity, and considers femininity less worthy. For example, notions of physical strength, emotional neutrality, assertiveness, self-reliance, reason, objectivity and rationality are commonly associated with masculinity, compared with the passivity, emotionality, self-sacrifice associated with femininity. Kenway and Fitzclarence (1997) maintain that these discourses of hegemonic masculinity provide a repertoire of behaviours/justifications that when exaggerated, distorted and glorified, allow for/result in violence. Following Miller (1987b), the unfixed and fragile nature of masculinity is deemed an important factor in violence. Violence is enacted when unseemly (feminine) emotions are split off from a masculine identity, and projected or displaced onto external objects or people. Contempt for weaker people or those seen as other, allows for the purge of inappropriate aspects of the self, and the derogation of the people such emotions are seen to represent. Kenway and Fitzclarence (1997) constitute violence between men as a contest for dominance and power. For men with marginalised masculinities, risky and violent behaviour is theorised as one of the key ways in which power, dominance and resources may be gained in the absence of other avenues. A lack of structural power can result in the enactment of violence at the group or individual level: Kenway and Fitzclarence (1997) note that this form of violence can be seen as a consequence of society’s failure to integrate all its members. While verbal and physical harassment and teasing of girls by boys, and the objectification and denigration of women is rife, Kenway and Fitzclarence note that more serious physical violence against women is perpetrated by males who subscribe to traditional views of male power and gender roles, and view violence as an acceptable way to resolve conflict. Thus, the exercise of violence in this context is tied to maintaining the power inscribed in a masculine identity.

Kenway and Fitzclarence maintain that, insofar as gender, age, and marginality at structure school cultures, and emotional neutrality and hyper-rationality are valued in pedagogy and practice, schools need to examine the ways in which they contribute to, and support the constitution of, hegemonic masculinity, and are complicit in the production of violence. For example, when schools “fear the ‘feminine’ and avoid and discourage empathetic, compassionate, nurturant and affiliative behaviours and emotional responsibility, and instead favour heavy-handed discipline and control, they are complicit; if they seek to operate only at the level of rationality, and if they rationalise violence (eg, boys will be boys), then they are complicit” (Kenway & Fitzclarence, 1997, p.125). Other ways in which schools may be complicit in violence include endorsing the culture of male entitlement, and putting the needs of males above those of females, not allowing adolescent students opportunities to develop wise judgements and act autonomously in responsible ways, and marginalising or stigmatising groups of students. While they are not clear on how schools can address violence effectively, they point to an examination of key variables informing school structure (listed above) as a start.

Drawing on their extensive evaluation of the implementation of gender reform strategies in Australian schools, Kenway et al. (1997) make some suggestions to guide anti-violence education. Firstly, they note that approaches which ‘preach rather than teach’, and are destructive rather than deconstructive
and reconstructive, do not work. The corollary of this finding is that a socially critical/deconstructive negotiated curriculum, in which students are guided to find their own truths and plan their own actions with respect to gender, marginality, age and violence, would be most effective. They suggest a second problem to avoid in an anti-violence pedagogy is destabilising gender and gender identities, without recognising and working through the emotional labour that is done by teenagers who are involved in shaping and investing in their identities. Kenway and Fitzclarence argue for a ‘pedagogy of the emotions’, which recognises the way ‘the big picture is represented in students’ emotional worlds, and which helps them develop emotional intelligence to understand the implications of their emotions for the ways they behave’ (p.127). This latter suggestion invites an examination of the way in which schools deal with students generally, in terms of rationality at the expense of emotion, a practice the authors contend is implicated in the reproduction of violence.

To get beyond the constraints of psychological theories which focus exclusively on internal dynamics, and social theories that over-emphasise structure at the expense of interpersonal and internal dynamics, Kenway and Fitzclarence suggest an anti-violence pedagogy based on narrative therapy (White & Epston, 1990). This therapy uses the metaphor of ‘story’ to help people examine the way they construct identity. It is based on the premise that people construct dominant stories for themselves, in making sense of and shaping their lives; and that change can occur by helping people to identify critical moments when they acted in ways counter to their dominant story. An alternative story-line, based on people's own experiences, can then be constructed through which alternative identities and relationships can be built. Kenway and Fitzclarence (1997) cite three advantages deriving from the use of narrative approaches: stories are already a dominant way of meaning-making within schools; the unfixed nature of storytelling opens up opportunities to retell identity as a path to constructive change; through linking personal stories to wider cultural stories and meanings, personal experience can be considered within wider meaning frameworks.

The suggestions of Kenway and Fitzclarence are considered in a wider discussion of strategies for addressing gendered behaviour below.

11.9 STRATEGIES

A discussion of strategies useful in addressing gendered behaviour and well-being outside the context of curriculum seems somewhat arbitrary, for the simple reason that recent literature in the field of gender indicates that schools’ policies, as well as pedagogies and curricula, are implicated in the outcomes of their students (Connell, 1989, 1993; Eder, 1995; Mac an Ghaill, 1994; Gilbert, 1998; Gilbert & Gilbert, 1998; Skelton, 1996). Thus, to separate a discussion of ‘behaviour’ from a discussion of ‘learning and teaching’ is, strictly speaking, indefensible. This section looks at a range of strategies, from whole school approaches, to strategies used by individual teachers in response to problems identified in their own classrooms. Not all approaches have grown out of concern for gender equity; some address more specific problems, such as bullying. While both gender-specific and general strategies will be discussed here, our primary interest is those strategies used to influence gender equity in schools.

One further issue to bear in mind relates to the focus of strategies. Strategies at different periods have been developed, sometimes with the interests of girls, and more recently with the interest of boys, as central. Indeed, one of the criticisms of some of the ways issues around the men’s and boys’ movements have been framed, has been their tendency to pick up understandings and strategies from the early feminist movement without critical evaluation. This has led, in some cases, to not particularly efficacious strategies (and arguments) being rehashed in the interests of boys (Kenway et al. 1997). While strategies addressing one or other gender usually had implications for the gender not in focus, a common theme of more recent theorising is the need to examine masculinity and femininity in relation to each other.
An implication of this position is that problems that may have received attention in ‘isolation’ in the past, for example, strategies for sexual harassment and strategies for bullying, may be better addressed by looking at gender-identity construction as a whole. For example, teaching girls how to deal with sexual harassers while disciplining boys not to do it overlooks, in an important way, teaching children the skills critically to understand themselves as masculine and feminine, and how these identities shape behaviour more broadly. It also ignores the way such phenomena are part of a wider pattern inherent in institutions such as the school, media, and family.

Part of the problem of presenting and evaluating strategies has been touched on in a review by Gilbert and Gilbert (1998). Speaking of the important, practice-based Australian book *Boys in Schools* (Browne & Fletcher, 1995) they write:

‘Any particular concern is addressed using a number of strategies, and any particular strategy is justified in terms of a number of concerns. As a result, it is difficult to identify specific goals of particular strategies, and to gauge their success.’ (p.225)

Following Gilbert and Gilbert (1998), and drawing on the implications for practice/intervention presented in the literature reviewed, we discuss the relative merits and pitfalls of common strategies, using examples where beneficial. However, it should be noted that this organisation is somewhat arbitrary, in that many approaches use a combination of these strategies; and the pitfalls discussed tend to arise from their use in isolation.

### 11.9.1 Top-Down Disciplinary Strategies

Failure of some teachers and schools to take the issue of sexual harassment seriously has been noted in the literature (Stein, 1995; Mac an Ghaill, 1994; Kenway et al. 1997). One way of dealing with issues such as sexual harassment and bullying in schools is to have explicit and carefully policed anti-bullying, anti-harassment policies in place to keep students safe. While an important part of creating a safe physical environment in the school, when used in a generic way and in isolation from other strategies, these policies have their problems (Stein, 1995). For example, Gilbert and Gilbert (1998) and Mac an Ghaill (1994) note that policies that punish behaviour of individual students, but do not connect the behaviour to wider practices of racism and/or sexism, or recognise their function in supporting some forms of masculinity, are treating the symptoms while leaving the problem untouched. Without challenging the practices and beliefs of students, students can learn not to behave a certain way at school (the behaviour is suppressed), without considering the implications of their behaviour, or understanding how their behaviour fits into wider patterns of practice. Further, following the findings of Connell (1993), the imposition and breaking of such rules may provide the antagonist against which the masculinity of some boys is cut. In other words, when being in trouble is supporting a specific type of masculine identity for some students, such rules may work counter to their intentions.

An additional problem with heavy-handed disciplinary strategies is that they may be seen as modelling the exact sorts of domineering practices that are characteristic of hegemonic masculinity, and used by bullies (Kenway & Fitzclarence 1997; Epstein et al. 1998; Gilbert and Gilbert, 1998; Browne, 1995b). As this form of practice is implicated in the ‘problem’, schools need to support their disciplinary policies with strategies aimed at allowing students to understand and engage with why their behaviour is problematic, rather than simply trying to suppress it. A related recommendation, coming from the strategy literature, is that in order to change intimidating and bullying student relations, teachers and other school staff must create and model the sorts of ‘power with’ rather than ‘power over’ relationships characteristic of bullying (Shores, 1995; Browne, 1995). Successful behavioural and attitudinal change is seen as dependent on changing power relationships across the whole school.
environment. Shores (1995) an Australian educator involved in developing and running a Boys and Relationships programme (NZ years 6–8) since 1990 notes:

‘Programmes alone don’t work. The values, concepts and language presented in a programme need to become an integral part of the class and/or school. Once they are integrated, modelled personally (as well as professionally), valued and reinforced by the adults, then and only then is the climate ripe for attitudinal and behavioural change in pupils ... Programs of power-sharing may begin to work if we as teachers reveal the people we really are: by talking about things that worry us, telling the students when we feel powerless or scared, dropping our powerful fronts and feeling safe enough to talk with them.’ (p.107)

Carosi and Tindale (1995) report that initial efforts at quelling the considerable violence at Canterbury Boys High School in Sydney failed when staff attempted to impose new disciplinary rules. However when the whole school and community was involved in developing rules and disciplinary strategies based on the Glasser system, violence within the school demonstrably dropped. The system is based on four key components: teachers evaluating how their behaviour may have contributed to student misbehaviour; positive reinforcement of good behaviour; negotiation to settle problems, with a clear process known by all in the school and community; and finally, students taking personal responsibility for their behaviour – that is, they have choices in how they act, and know the positive and negative consequences of their behaviour. Carosi and Tindale (1995) report that extensive teacher and pupil involvement, and education about the system, as well as frequent reminders, keep the disciplinary system in focus. The beneficial effects of the disciplinary system have been demonstrated by a drop in teacher absenteeism, and positive survey evaluations and school assessments.

In the New Zealand context, Murray Lints (1999), principal of Whangarei Boys High School, also identifies a disciplinary strategy, based on students taking responsibility for their own behaviour (the Canter system) as one of the key elements in a Safe School Policy aimed at reducing violence with the school.

11.9.2 Skills for Students and Teachers

Teaching skills to students, such as effective communication, active listening, conflict resolution and assertiveness, have been recommended, and form a part of many strategies aimed at reducing bullying, sexual harassment and improving peer relationships (Eder et al. 1995; Combes, 1995; Freeman, 1996; Griffiths, 1995; Browne, 1995; Shores, 1995; Clarke 1995). Gilbert and Gilbert (1998) note that one danger of approaches used to upskill individuals is that the issue of how anti-social behaviour relates to/maintains wider power relations may be ignored. For example, they cite the work of Hinson (1995), who provides evidence from schools that suggest sex-based harassment and bullying is not caused by a lack of social skills, but rather, students who act in this way do so because of the power it offers them, and also because the behaviour is socially sanctioned. This criticism is supported by studies, such as Connell (1993) and Eder et al. (1995) that show how the anti-school, harassing behaviour of some boys (for example, insult exchanges) is related to proving their masculinity, in a way that garnered personal power or status for some boys.

While these criticism stand, Gilbert and Gilbert note that teaching students how to deal more effectively with situations like harassment are an important component of a comprehensive approach to dealing with (boys) behaviour. It is also worth noting, that while the relationship of anti-social behaviours to wider social structures, such as patriarchy may not be linked in these approaches, offering students new ways of dealing with conflict and having their needs met, is giving them experiences of alternative ways of “doing” masculinity and femininity, without perhaps explicitly addressing gender identity as such. In addition, it is worth noting that strategies working on skilling
students in working collaboratively (eg, Shores, 1995) or providing students with skills to defuse or counter harassment (eg, Combes, 1995) are often presented in the context of wider initiatives addressing gender issues/relationships.

### 11.9.3 Personal Development

Similar criticisms to those of skills training have been levelled at approaches that aim to work on feelings such as self awareness, self-concept and self-esteem. For example the Australian Gender Equity Taskforce (1997) write:

> ‘There are a number of programs that have been developed on the basis that boys’ problems can best be solved through an approach which celebrates masculinity, and which helps boys discover the ‘warrior within’. Such programs are likely to increase dualistic thinking, which denigrates femaleness. This will only escalate violence.’ (p.46)

However, further on the authors pick up a point that is made in research coming from both essentialist (eg, Biddulph, 1997) and social camps (eg, Kenway and Fitzclarence, 1997; Mac an Ghaill, 1994):

> ‘At the same time it is important that boys’ programs still allow boys to feel good about themselves and not adopt a negative blaming tone, as this will also be counter productive.’

(Gender Equity Taskforce, 1997, p.46)

For example, Browne (1995b,c) has developed ways of working with boys that, while working on their self-awareness, does not uncritically reinforce masculinity. As part of the process, boys become more self-aware, through identifying their behaviours and looking collectively at the beliefs and values underpinning those behaviours. Through this process, boys are enabled to look at other ways of being male that break the traditional male stereotype. Once again, while alternative ways of “doing” masculinity are opened up to boys in such programmes, a critical knowledge of how and why they take up these values and behaviours may be ignored in such approaches (Note Browne, 1995b, advocates a much wider agenda for boys’ schooling than is discussed above).

Personal development approaches for girls have often involved raising their self-esteem and self-confidence, which is commonly held to decline during adolescence (Combes, 1995; Shatford, 1995; Hannan, 1995; Sadker & Sadker, 1993). While approaches focusing on what girls lack (eg, self-esteem, confidence) have been criticised for the negative or deficit positions offered to girls (Jones & Jacka, 1995), efforts to raise self-esteem often involve helping girls develop a critique of their positions in society and also helping to generate alternative messages/positions and other coping strategies (Combes, 1995). Thus, personal development is often combined with skills training, and knowledge based strategies.

Personal development approaches that encourage students to be self-reflective, and examine the processes by which they came to hold their beliefs, can provide useful points of engagement for wider knowledge based initiatives.

### 11.9.4 Knowledge-Based Strategies

The category of knowledge-based approaches runs the gamut of simply being able to recognise and name bullying and harassment for what it is (eg, unacceptable behaviour that need not be put up with) (Stein, 1995; Briggs & Hawkins, 1996), to those geared to attitude changes (Freeman, 1996), through to approaches aiming at sophisticated critiques of power and practices, and the way they constrain the possibilities for being masculine and feminine (Davies & Banks, 1992; Gender Equity Taskforce,
Knowledge-based strategies encompass approaches that do not deal with power at all (e.g., early liberal feminist approaches), deal with power in a monolithic way, for example: an understanding of women as oppressed by men and the patriarchy, through to more post-structural approaches that examine how power is implicated in the production of masculine and feminine positions taken up and resisted by subjects/individuals.

Through the 1970s and 1980s, the aims of knowledge strategies were primarily to encourage girls into ‘non-traditional’ subjects (Delamont, 1999; Gilbert, 1998; Kenway et al. 1997), often by informing them of the subsequent labour market benefits. Girls’ choices were seen as limited by their take up of narrow sex-roles that were antithetical/oppositional to ‘masculine’ subjects, such as mathematics, science, and technology. Within schools, these strategies were supported by attempts to eradicate stereotyped material from textbooks, pay equal attention to boys and girls, provide positive female role models and generally reduce sex differentiation. Delamont (1999), in review of gender equity policies in Britain from 1973 to 1988, notes that generally, these policies were not as successful as was hoped, for several reasons: they were focused in urban, rather than rural areas; they focused on girls and women, rather than boys and men; they were targeted at the secondary school only; they focused on teenagers without attention to teachers and parents; they focused on what adults thought pupils’ ideas were and worked on those, rather than finding out what students actually thought and working with them; programmes were ‘sanitised’ to remove discussion of sexuality and sex; they were narrowly focused on mathematics, science and technology, to the detriment of humanities, social sciences and aesthetics; they ignored social relationships in the school and workplace, and finally, the consequences of the de-industrialisation of the male labour market were not addressed.

In the 1990s, teaching about the limited ways of being masculine implicit in sex-role stereotypes, and the ways these stereotypes impinge particularly on social, health, and but also educational outcomes, are advocated for boys (Browne, 1995a, b, c; Shores, 1995; Kokori, 1995). Initiatives have been reported in a regular classroom context; for example, in drama Kokori (1995), in history Littlewood (1995), and also in the context of longer block courses within curricula, such as health and personal development (Shores, 1995). While some of these approaches also address the way in which the sex-role stereotype of males grants them unequal power in society, and acknowledge different ways of being masculine, teacher-educators working within post-structural frameworks point out the limitations of strategies based on the notion of sex-role stereotypes:

‘Having discovered feminist post-structuralist theory as a way of making sense of equity issues in classrooms ... we have increasingly become convinced that the children too need to be given access to some of the elements of post-structuralist theory, if they are to be liberated from the burden of the unitary self, and the limiting storylines that some of them are caught up in ... We are convinced, from our data collection and analysis to date, that equity programmes which simply introduce the ideal of equity, and which rely on role models and access to non-sexist curricula, will not be enough to disrupt these strongly held theories of gender, and patterns of desire.’

(Davies & Banks, 1992, p.23)

The argument is that school children have already taken up the dominant storylines and discourses of gender as their own. Thus, any information presented is taken in by students already positioned by gendered discourses. Without an understanding of how and why they have taken up these understandings and stories, and how they can be disrupted, children continue to filter information through an unchallenged gender dualism. In contrast to sex-role stereotypes, which come from a theoretical position of constancy and uniformity within the individual, post-structuralist approaches make sense of the possibility of change through the idea of multiple positioning within discourses. Examining the way we, as people, are positioned by multiple discourses makes sense of the idea that
Explain and Addressing Gen
der Differences

we can look beyond the dominant stories of our lives to explore alternatives. Examining the way we behave, and what we believe and desire, becomes not only a matter of what it means to be man or woman, masculine and feminine, but how these identities intersect with discourses of sexuality, ethnicity, disability and poverty/wealth.

Such approaches also move away from the idea of a ‘real’ and ‘socialised’ self, which can perpetuate the idea that we do not have a choice about our behaviour, thus limiting the scope for flexibility and change.

Knowledge-based approaches form an important part of any overall strategy to work with gendered behaviour and well-being of all students. Taken as a whole, the literature suggests several elements are important for addressing gendered outcomes.

### SUMMARY OF STRATEGIES

Based on our synthesis of the literature about strategy and gender in schooling, we offer several suggestions for providing emotionally and physically safe school environments. These suggestions are split into those addressing what schools and educators can do, and then how they could proceed. We acknowledge that within New Zealand schools and communities there are already a wealth of programmes and groups working towards delivering a safer emotional and physical environment for their students (see Lints, 1999; Field, 1999; ERO, 1999 for accounts of some of these initiatives).

**Suggestions from the literature reviewed on how to go about implementing a safe emotional and physical environment:**

- Explore and engage with students' experiences of gendered violence and harassment as a starting point for eliciting change; map the extent of behaviours such as bullying and harassment within the school.

- Teach students through dedicated courses (health and physical education, social sciences, for example), about gender construction, and how different ways of being masculine and feminine limit their social, health and educational outcomes. This includes attending sensitively to students' negotiation, and emotional investment in their identities. The literature indicates this can not be separated from dealing with sexuality and sex, as these constitute positions of masculinity and femininity;

- Teach students the skills required to have successful relationships, including conflict resolution, communication and mediation;

- Provide professional development to teachers, to facilitate their learning of gender construction and how it is implied in school conflict and violence; acknowledging the importance of their own behaviour as models for students. Provide teachers with the skills to facilitate the learning of students in these areas;

- Examine the way school practices are implicated in perpetuating/creating unacceptable gendered outcomes. This may include: examining disciplinary strategies; looking at extra-curricular activities supported by the school; finding ways to incorporate values of gender equity; and inclusion in all curricular areas – being inclusive.

- Have a whole school policy against discrimination and gendered violence, which is supported with training and education for all staff and students, with clear expectations and processes in place that are understood by all; the policy needs to be implemented consistently throughout the school.

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### Summary of Strategies (continued)

_Suggestions from the literature reviewed on how to implement a safe emotional and physical environment:_

- **Teach don’t preach**

  The research and intervention literature suggests approaches aiming to help secondary students to identify their own issues, and develop steps for action be most successful (Kenway et al. 1997; Browne, 1995; Delamont, 1999; Mac an Ghaill, 1994; Martino, 1995; Shores, 1995). This approach ensures the issues are relevant to students’ experiences, students are engaged with the issues, and also allows educators to gauge where students are placed, in relation gender issues, for effective teaching. In addition, these suggestions are consistent with constructivist/post-structural theories/pedagogies that view knowledge as a negotiated product involving both what the teacher, and student, bring to the class.

- **Deconstruct rather than destruct**

  This is related to the above point, and emphasises that educators should negotiate lessons, and work with students, rather than confront or criticise their identities with respect to gendered violence and social outcomes, in a destructive way. Also implicit in this point is the need to provide a safe environment for students to explore gender issues and how they intersect with other aspects of identity, providing intellectual (rational) and emotional support (Kenway & Fitzclarence, 1997; Browne, 1995; Shores, 1995).

- **Provide a way forward**

  This point is related to the one above. Having students’ critique their behaviours or beliefs without providing solutions or alternatives that meet students needs, is unhelpful at best and cruel at worst. Connell (1993) and Jackson (1998) both speak of the confusion of men and boys who, when confronted with the negative impacts of their masculinity, are not offered positive avenues to effect change. Similarly, it is important that girls not see themselves as passive victims to some boys’ behaviours (Gender Equity Taskforce, 1997);

- **Model positive behaviours**

  Based on the assumption that it is not just what teachers say, but what they do, that is noticed by students, several researchers/educators suggest teachers should attempt to model the values and behaviours expected of students (for example, Shores, 1995; Gilbert & Gilbert, 1998; Browne, 1995b).
SUMMARY OF GENDERED BEHAVIOUR IN SCHOOLS

Apart from truancy statistics, in which boys and girls are equally likely to feature, boys are over-represented in negative statistics such as suspensions and overt forms of bullying and violence at school. Boys are also more likely to be the subject of class-room discipline. These statistics mask the variability in behaviour of both boys and girls.

Several explanations of gendered behaviour patterns have been put forward in the literature. In general, social theories have the greatest explanatory power in accounting for differences between groups of boys and girls from different social, economic and ethnic backgrounds, and also of boys and girls within these groups.

Recent international classroom-based research underpinned by post-structural and/or social constructionist perspectives indicate that students, in collaboration with their schools and communities, are implicated in producing a variety of ways of being masculine and feminine. These masculine and feminine positions are not permanently fixed to students, but students are involved in re-creating them in their interactions with each other and the school.

The current culturally authoritative form of masculinity (hegemonic masculinity) is critically defined by social practices that belittle femininity (sexism/sexual harassment), and other masculinities (for example, homophobia). To address ‘problem behaviour’, and open up alternative ways of behaving, the influence and power of hegemonic masculinity needs to be critiqued at a number of levels.

The literature shows schools (explicitly or implicitly) may contribute to the production of various forms of masculinity and femininity, and their attending behaviours through:

- the use of disciplinary practices (eg, top-down vs personal responsibility approaches; strategies that shame boys by comparing them with girls);
- channelling students into ‘gender-appropriate’ subjects;
- streaming practices that set some students as successes or failures;
- providing curriculum content (eg, in health) that honours some masculine and feminine identities and silences others;
- supporting some school activities (eg, sports) that are associated with aggressive forms of masculinity while ignoring others;
- failing to take sexual harassment and bullying (including its source) seriously.

Strategies for ameliorating ‘problem behaviours’ require whole school approaches that include:

- a negotiated (secondary school) and explicit disciplinary policy that actively protects all groups of students;
- a move to inclusive pedagogy and curricular content;
- valuing a variety of extra-curricular activities;
- equipping students and staff with a range of personal and critical thinking skills.

Most of the research reviewed was derived from international contexts. The critical role of specific cultural contexts in producing positions of masculinity and femininity suggest that to address gendered behaviour, local classroom-based research is required to inform practice.
Chapter 12: Synthesis and Implications

‘What makes New Zealand different and distinctive? Why are we so uncertain about our national identity? ... our society is less harmonious, more class-ridden and more fractious than ever before. Can we afford to continue down the present path where everything is judged against the values of the free market?’

(Laidlaw, 1999)

(former All Black, Human Rights Commissioner, Rhodes Scholar)

12.1 APPROACH TO THE SYNTHESIS AND IMPLICATIONS

Our aim in this chapter is to bring together the key understandings and findings that have emerged from this review of the research literature, and commentary on gender differences in the compulsory school sector. That task is formidable, because we need to represent what has been said and to mark the significant silences in the research literature about New Zealand girls and boys in New Zealand contexts. As we draw together insights arising from our cross-curricular comparisons, new understandings emerge. Through the disjunction of what are clearly constituted by students, schools and socio-cultural traditions to be deeply gendered contexts of feminine or masculine curriculum traditions, we have come to understand that the way knowledge itself is divided and re/presented in curriculum stratifies by gender. As we bring together our findings, we make reference to the wider New Zealand and international literature on gender and education to help interpret what the synthesis is revealing. We attempt also to synthesize the emerging themes from the review, in relation to the policy context provided in Chapter Three. Our purpose is to translate the findings into implications that are situated within the wider educational frameworks for development in both policy and practice.

12.2 REVISITING GENDER POLICY IN CONTEXT

Our considerations of gender occur within the context of a shift in government policy that positions education as the engine of a knowledge society. Patterns of men’s and women’s participation in the wider society are rapidly changing. Hood (1999) argued, in the context of a focus on boys, that our secondary schools in New Zealand do not prepare students for the nature of a changing workplace in a global community. Males earn more than females in the paid work force, but the gender gap has reduced markedly from 1981, when men earned, on average, two thirds more than women. Recent statistics show men to be earning one sixth more than women. The school leaving age has risen during the decade of study, and schools have been catering for a group of students who would previously have been in the workforce. Male unemployment figures rose above female unemployment figures during the focus decade.

New Zealand expenditure on primary education is substantially less than the OECD mean, and expenditure on secondary education is slightly less. Teacher pay, lower student teacher ratios and teacher education have been found to be positively related to future earnings. Teacher education shows the most cost effective benefit in student achievement.

New Zealand has higher proportions of female teachers than the OECD means, and the OECD figures show a strong relationship between higher teacher salaries and higher proportions of males in teaching. New Zealand teacher salaries have been comparatively low by OECD standards, although in recent years there have been increases in teachers’ salaries. While highly qualified committed men and women are needed in teaching, US research suggests males in pre-service education and teaching are likely to be less qualified, and less committed to schools. Research indicates that a third to a half of New Zealand teachers would like to leave the profession. Primary and secondary teachers are working comparatively long hours. Little additional time is available for professional development.
Researchers in the school effectiveness and school improvement movements, and the school change fields, have found the teacher to be far more important in school development than previously thought. Teachers are reported to contribute to about 40 percent of the variance in student scores, while schools contribute to about 16 percent of the variance. Recent New Zealand research shows schools to have more effect as the increased stratification by social class and school mix influences compound.

The market model of school choice has increasingly stratified schools by social class and ethnicity. There have been some opportunities offered to girls by the market, although in the UK some communities have implemented practices that constrain girls’ opportunities. There are signals that the market model has been problematic for some boys. Disproportionately more boys’ schools have been closed down in the UK. In New Zealand boys have been over-represented in increasing suspensions, particularly Māori boys. A turbulence factor has been found in low decile New Zealand schools that have been losing students.

A range of theories has been used to explain gender differences in education: essentialism, social learning theory, cognitive development theory, gender schema theory, psychoanalytic theory, social constructionist theories and post-structural theory. Current gender policy is chiefly incorporated in the National Education Goals and National Administration Goals, which require a safe physical and emotional environment to be provided for students, and equal opportunity schooling. The new national curriculum, that has been developed since 1993, requires a gender-inclusive curriculum that meets the needs of boys and girls. These policies have arisen out of a history of equity discourses in New Zealand, including social democracy, equal opportunities, equality of the sexes, girl as deficient or disadvantaged, gender difference, and equitable outcomes. Girls, rather than boys, have been the focus of gender policies until the mid 90s, when boys and masculinities became an increasing research focus.

The Girls and Women Section in the Ministry of Education was disestablished in 1992 and no other infrastructure to resource gender policy issues was put in place. Federal initiatives in Australia have produced a gender equity framework focused on heterogeneous groups of girls and boys. These initiatives have been supported by action plans, outcome indicators and monitoring strategies. The Australian framework focuses on understanding the process of construction of gender, curriculum teaching and learning, violence and school culture, post-school pathways, and supporting change.

During the decade of study, teacher education has been deregulated. A market model has prevailed, but remuneration had been set at a ceiling level for primary teachers, after a three year pre-service training. The market model has constrained New Zealand teacher education for primary training to operate at the low end of the international ‘market’, where four year training is common. Five year programmes have been introduced because of the strong relationship between teacher education and student achievement shown across curriculum areas. Because of the changes in teacher education for primary, and the separation of research and teaching in tertiary, a substantial body of the research reported in this review occurred in the contexts of courses and programmes that no longer exist.

12.3 Gender in Context: Gender, Social Class, Ethnicity and the Need for Relational Discourses

In our detailed discussions of participation and performance across the curriculum chapters, we have addressed the complexity and apparent fluidity of gender differences. As can be seen in our three National Education Monitoring Project summaries shown in Figures 12.1, 12.2 and 12.3, significant gender differences at primary level are apparent. Our visual depictions of the National Education Monitoring Project findings should be interpreted with caution, and in the light of the full discussions in Chapters Four to Eleven. Because of the different numbers of tasks used for assessments in each curriculum area, our percentages magnify the differences where there were fewer tasks (for example,
in art). As discussed through the curriculum chapters, trends changed from primary to secondary, and on different kinds of assessments. However, particularly in relation to the findings for decile levels shown in Figure 12.2, patterns of significant difference in performance on over half or even three quarters of tested tasks indicate serious cause for concern for the girls and boys whose results they reflect.

The National Education Monitoring Project assessments show more of the gender gaps to favour girls than boys. The contrasting trends in science, and in social studies, for different assessment measures suggest that the gender gaps are a function of boys’ performance in relation to specific curricular areas and assessment situations. Girls performed slightly better on the TIMSS studies at primary science level, but boys performed more highly on secondary school level science assessments. The marked differences favouring boys in science appear to increase through the primary school on National Education Monitoring Project assessments, although these findings contrast with those for the results on TIMSS. Interestingly, in science, there was no gender effect apparent in the literacy assessment tool of the open-ended questions, indicating that boys’ problem with literacy is specifically linked to English, and language, as a subject area.

The gender gaps favouring girls’ achievement are most marked in speaking and reading. Gender gaps in performance on reading, literacy and English have been evident in New Zealand assessment data for over a hundred years. Of particular concern is boys’ poorer performance on information skills, because these enable access to information across the curriculum. The National Education Monitoring Project assessments show boys to slightly close the gender gap at the Year 8 level. The slight relative improvement of boys’ achievement relative to girls’ achievement may suggest that this difference is being addressed at some level by teachers, and boys themselves. The IEA study of reading literacy showed both boys and girls to be performing well above the international mean at 14 years. While the issue of boys’ relatively lower achievement in literacy is a serious concern, we would be mistaken to give that curriculum area more weight than mathematics where, on average, New Zealand students, male and female, are doing very poorly at primary level. We suggest that the gender gaps should be considered in the context of overall standards, and propose a strategy that simultaneously addresses issues of gender and achievement in literacy and mathematics.
FIGURE 12.1: SUMMARY OF NATIONAL EDUCATION MONITORING PROJECT GENDER DIFFERENCES

Science

Mathematics

Speaking and Reading

Art

Music

Technology

Social Studies

Health and Physical Education

Information Skills

Graphs, Tables and Maps
FIGURE 12.2: SUMMARY OF NEMP DECILE DIFFERENCES

Science

Mathematics

Reading & Speaking

Art

Music

Technology

Social Studies

Health & Physical Education

Information Skills

Graphs, Tables and Maps
FIGURE 12.3: SUMMARY OF NEMP ETHNICITY DIFFERENCES
Boys seem to do much better on graphs, maps and tables, both in the information skills area and within the social studies curriculum as they progress through the school. Girls perform better on arts – an entirely expected finding, given the research revealing boys’ antipathy for another subject they see as constituted through the feminine. On art tasks however, the gender gap in favour of girls lessens, as students move upwards through primary school. Also, the findings for significant differences for Māori students at Year 4 level disappear at the Year 8 level. Music appears to play an increasing role in gender and cultural stratification through the school. This finding raises concern, posing a cultural challenge for the new arts curriculum in progress.

Gender specific differences (rather than gender gaps) are apparent in girls’ higher performance in health and boys’ higher performance in physical education. This pattern is also apparent in technology although, as was discussed in Chapter Eight, girls’ attitudes to technology appear to deteriorate throughout the school system.

Girls do better on primary mathematics assessment, both within the National Education Monitoring Project assessments and in TIMSS. The low performance of both boys and girls by international standards at primary level is of considerable concern. The TIMSS assessments at secondary and school leaving age indicate that New Zealand secondary teachers are having a significant impact on raising the mathematics achievement of senior students (who do not discontinue their studies) overall by international standards. Boys are doing significantly better, on average, on international measures in mathematics and science at school leaver age.

Overall, these analyses of gender differences show:

1) Gender differences to be fluid and to be linked to particular curricular and school level contexts.

2) More gender differences to be linked to girls’ higher performance at primary level, although science and social studies are exceptions to this pattern.

3) An apparently contradictory pattern at secondary level, where boys on average do better on mathematics and science on international assessments, but girls do better on national assessments, and girls do better on literacy assessments, on average.

School Decile Level

What is immediately and overwhelmingly visually apparent in the summary of National Education Monitoring Project Performance differences by school decile level is that the girls and boys who are doing particularly poorly are those in low decile schools from low decile communities (see Figure 12.2). Students in low decile schools did significantly more poorly on about three quarters of the assessed tasks or more for mathematics, social studies, literacy and information skills on National Education Monitoring Project tasks. In every case, students in the highest decile schools did better, on average, than students in low decile schools.

Although differences in music are slightly lower, what appears to be happening in both social studies and music is that these curricular areas increasingly stratify students’ performance by decile level and gender. The comparative pattern of highest performance for students in decile 8–10 schools, next highest performance for students in decile 4–7 schools, and lowest performance for students in decile 1–3 schools recurred across all but one assessed area. An exceptional pattern occurred on physical education tasks, where students from low decile schools performed significantly better on some tasks.

The research reviewed across curricular areas shows that there is a compounding school effect associated with attendance at low decile schools that further influences the lower performance of these
boys and girls. This school-mix effect appears to be related to the compounding effect on achievement that has been identified as an influence on students who are placed in low or mid-track streams, when streaming is used (Oakes, 1985; 1986; Slavin, 1987, 1990; Massachusetts Board of Education, 1990).

**Ethnicity**

We have not presented the National Education Monitoring Project findings for students in schools with larger Pacific populations, because we have found that way of constructing poorer achievement (related to wider school population by ethnicity) to invite inappropriate deficit constructions, simply because of the sampling strategy used. Both the Education Review Office, and the National Education Monitoring Project, have just begun collecting national data on the educational performance of Pacific students in 1998. However, the findings from the review are clear. Although there are now many leading and highly qualified leaders in Pacific education, Pacific students, in general, are performing far more poorly in New Zealand by international standards than any other ethnic group.

This finding should be understood in the light of the point made in Chapter Three by Tamasese (1988), cited in Pihama and Mara, 1994) that the reality for many Pacific people is one of low paid jobs. However, the significant analysis of the mismatch between the cultural practices of the school and Pacific working class girls in research reported by Jones (1991) suggests that the explanation of symbolic cultural violence needs revisiting, and much research and development is needed.

When considering the National Education Monitoring Project findings for Māori, it is important to note that the Kura Kaupapa have only just entered into the National Education Monitoring Project assessment programme, and the National Education Monitoring Project findings do not reflect the achievement or attitudes of children in immersion programmes. Given the findings of Carkeek, Davies and Irwin (1994), that immersion programmes appeared to offer much more positive classroom interaction experiences, and more gender balanced curriculum, it is likely these students will not reflect the patterns in mainstream education. Hohepa’s (1997) finding about the serious dearth of Māori language curricular resources may be another influential factor.

In concluding our review of gender, it is important to note the pattern on TIMSS showing that, in general, Māori boys do more poorly than Māori girls. This gender gap is particularly significant in English literacy at Year 5 where, for instance, Māori girls perform above the international mean, but Māori boys’ achievement is below the international mean. The likely compounding effect of the feminine construction of a literacy tradition that has its roots in a different cultural heritage could explain such a differential gender pattern influencing Māori boys in mainstream education.

As is evident in the National Education Monitoring Project assessments (Figure 12.3) Māori girls, on average, and boys in mainstream settings, do significantly more poorly on mathematics, science, English literacy, information skills, social studies and graphs, maps and tables. While older Māori students’ performance appears to be better on graphs, maps and tables in the primary school, this pattern of better performance does not apply for information skills as Māori move up the primary school. Social studies shows the strongest stratification effect for Māori girls and boys in mainstream classes. That this effect is linked to curriculum is apparent in the one exception that occurred for higher Māori performance, on a task focused on a marae context in the National Education Monitoring Project assessments.

Although, throughout the body of the review we have provided an in-depth consideration of the complexity of factors affecting primary and high school assessments, the National Education Monitoring Project findings provide a rough index of the relative impact of gender compared with ethnicity or school decile level. Overall, school decile level was related to the largest gaps in performance on the National Education Monitoring Project assessments. Significant differences by ethnicity were the next greatest level of disparity, and gender differences were the least evident of the
three variables. The boys who are doing particularly badly are Māori, Pacific and Pakeha boys attending low decile schools. Similarly, the girls who are doing particularly badly are Māori, Pacific and Pakeha girls attending low decile schools. Māori in mainstream and Pacific students, in general, are more likely to be doing poorly than Pakeha girls or boys. Patterns of gendered performance pervade at low levels across these patterns, by ethnicity and decile level, but vary according to the subject area and school level.

We conclude, from our exploration of the research and assessment data available, that considerations of gender need to be carried out, with specific reference to the particular ethnicities, social class and cultural positionings, and school decile levels, (under the current system) of particular groups of students. Although gender, ethnicity and social class intersect and interact in particular contexts to produce particular outcomes that may vary (eg, immersion programmes), these findings of national patterns give rise to national concerns. Throughout our literature review there have been many and repeated calls for research that will inform educational development for Māori and Pacific girls and boys.

12.4 GENDERED CURRICULUM: FEMININITY, MASCULINITY AND CURRICULUM

Our use of curriculum as an organising tool for the review has had a powerful impact. Usually, the marked impact of curriculum is not immediately apparent in considerations of gender that do not make curriculum area salient or conceal particular curricular patterns within cross-curricular scores.

What has been apparent in the research is that the curriculum statements themselves have given rise to much professional discussion, as they have emerged. Whether or not these initiatives have been associated with major research programmes has been more variable. But it is clearly evident that much more research is available for science, which was published in 1993, than is available for the arts curriculum — where there is little New Zealand educational research.

Our decision to attempt to include research for at least some part of each of the major curricula areas has enabled us to deepen our understandings about the extent to which curriculum areas are implicated in the gender stratification carried out by schools. Some of the sharpest research insights come out of the incidental observations of boys’ responses to arts curricula activities. The deeply gendered structuring of arts and music curriculum within the schools may in itself partially explain the frequent omission of this curricular area from consideration of gender.

For boys, to participate in art can be to risk positioning oneself as a ‘girl’ or a ‘poof’. The research reviewed in Chapter Seven reveals that boys who do break out of the constraints of hegemonic masculinity to participate in arts, may or may not find a safer place to be in school. They can incur verbal and physical abuse from other boys, or even teachers, for their choice to be ‘losers’. In Stephen’s (1996) study of fifth form boys the drama teacher made it clearly evident that there would be no place for ‘poofs’ in the drama room.

Although such gendered regimes must be differently situated within different cultural groups and school communities, what is startling is the number of New Zealand studies of gender that include, as a brief aside, the entrenched association of the arts, and in particular music, with feminine positionings. This finding is evident from pre-school through primary and secondary (for example, Bird, 1992; Norris, 1999, Stephens, 1996; Town, 1998).

Arts curriculum is also providing an arena where the intersection of higher socio-economic status and girlhood enable particular kinds of musical performance to accomplished. That the music curriculum is an area where both Māori and Pacific girls and boys do significantly more poorly than their Pakeha and other peers deeply implicates that curriculum, and its intersection with community, in cultural and gendered stratification. The music curriculum appears in the primary school to be exclusive and
excluding. However, the gendered regimes of the wider society, where boys prefer sports to after school engagement in formal music activities may also be implicated.

Literacy is also a deeply gendered area of the curriculum. To fully engage in literacy, or even to read a book, is for many boys in Swanderson’s (1999) findings to risk being a ‘wuss’, a ‘girl’, a ‘pussy’, a ‘queer’ or ‘gay’. Literacy has been constructed through schooling and the wider society, as a feminine activity. As long as such positioning continues, boys themselves will be the greatest influence on constraining their own participation in literacy. Homophobic regimes police boys’ behaviour more powerfully than any pedagogical practice could. Why should literacy be positioned in such a way? Lints (1999), like many New Zealand men, has blamed women teachers for boys’ poorer achievement in literacy relative to New Zealand girls, and evidently anticipates his claim to be debated:

from a fairly early age in their schooling boys are disadvantaged by the presence of girls in the classroom and by the classroom control practices of the predominantly female teaching force BAM! BIFF! WHACK!.......OUCH! (p.24)

These same teachers teach social studies and science, in which boys do better, so the teacher gender argument does not follow. Misogynist discourses that undervalue women teachers simply compound the ‘other’ ‘feminine’ positionings of literacy that repel boys. Delamont (1999) describes these arguments as the ‘discourses of derision’. What they do make vividly apparent is the importance of retaining the perspective of a cross-curricula focus.

Clearly, there are generational patterns of female preference for literacy activities and male abhorrence of, or disinterest in, literacy activities. When literacy is linked to masculine domains of sport or science, boys read. The wider world of the 21st century is not structured as the curriculum is – literacy is integral to the masculine, the feminine, technology and development. The arts, literacy and technology coalesce to create paths through the global internet. Some of the most successful interventions in science and mathematics in the US Maths Equals programme have involved curriculum integration, where journal writing is central to mathematics.

To integrate literacy into the science curriculum is to better reflect the day to day reality of the work of scientists. As long as educators construct a curriculum in which the context is gendered, and knowledge itself is gendered, then boys and girls will negotiate, resist and exclude themselves from knowledge on the basis of their gendered identities. For schooling to generate gendered possibilities, knowledge needs to be embedded within a multiplicity of gendered and cultural traditions and possibilities.

Curriculum integration within and across curriculum is not the only strategy needed to change the gendered categories of knowledge. The deep cultural undervaluing of the feminine is a problem for girls and a problem for boys, as they negotiate schooling. Strategies are needed to value both the feminine and the masculine, as sites for multiple ways of “doing girl and doing boy” that are not oppositional. This undervaluing of the feminine appears to have been so profound as to have become reflected in the low status not only of literacy. Roger’s (1999) contention that women school teachers are responsible for the All Blacks’ ‘failure’ in the world cup reveals the power of discourses that have linked teachers and education within a low status feminine category.

Education has been relegated to a low status position in our society, while also serving to stratify society, rather than to build diverse learning communities. The children of the middle classes are less likely to aspire to be primary teachers than once was the case. Unlike other countries, we consider our poorest qualified tertiary entrants to be the appropriate candidates for teaching — but not for law or medicine. It is timely that, as education has become re/positioned in economic theory as the potential powerhouse for building the knowledge society and a prosperous economy, then society should reflect upon the implications of the low status it has afforded the profession.
That science, mathematics and technology have long been understood to be masculine areas of curriculum is evident in the research. The gendered patterns of participation and achievement in mathematics and science at senior school partially reflect traditionally gendered notions about masculine and feminine domains. However, the impact of 30 years of equity policy designed to increase girls’ higher participation and achievement in these subjects, and the wider changes in society, are implicated in the changes.

In mathematics, science and literacy, the participation and performance of Māori boys, Pacific boys and Pacific girls is much lower than that for other groups at Year 5. By Year 9, Pacific girls and boys are doing more poorly than any other group in both science and mathematics. Māori girls, while doing better than Māori boys in these areas at Year 5, slip back in science by Year 9, and are still not performing at the international means. The patterns are complex. Although disproportionately high numbers of Māori boys discontinue in science, those who do stay on at senior school record above average mean scores on the TIMSS school leaver assessments.

The strategy of curriculum integration has been evident in the international Science, Technology and Society movement led in this country by teacher educators such as Robyn Baker. McKinley (1999) has suggested similarly an indigenous Māori pedagogy, that has a dynamic relation to the future, as it situates science in an ever-changing culture and society.

What is of particular concern is the very low level of achievement in primary mathematics for all New Zealand students, on average. That some students do very well on senior school leaver TIMSS assessments masks the outcomes of the many low decile, Māori and Pacific students who discontinue their studies, either within these subjects, or across schooling. Our review reveals very little New Zealand research that investigates enacted curriculum in mathematics classrooms, Strategies of language/mathematics evident in overseas development have not been so evident in New Zealand work on gender.

Technology within the new curriculum has, of itself, been an intervention in the gendered framing of knowledge in schools. Through confounding the traditionally feminine (such as home economics and design) with the traditionally masculine (technology and technical design), the New Zealand curriculum has apparently offered possibilities for both boys and girls to participate in technology. Technology curriculum is ideally structured, in ways that reflect the reality of the multiplicity of forms in which technology is embedded in everyday life, work and leisure.

Here, however, the research reveals that the gendered framings of New Zealand communities influence in-school participation. Our communities supply their sons rather than their daughters with computer access. Computer ownership is interacting with boys’ in-school dominance to reclaim technology to the masculine domain. Consequently, single-sex strategies have been far more evident in managing girls’ needs to access technology than in any other curricula area. However, even in these initiatives, technology has often been linked to the traditional masculine subjects.

What are needed are: better material and technical resources, knowledgeable teachers, informed parents, better access to computers, better management of gendered access issues, and the integration of technology across the curriculum into art, literacy, science, mathematics and particularly social studies.

The role of resources, human and material, in making technology accessible and successful as a medium within schooling, and the low access that has been evident in New Zealand schooling, means technology also supplies, potentially, the ultimate tool for stratification of New Zealand schooling. The consequences of inequitable schooling for the knowledge society will be dire stratification. What education could be doing, rather than effecting social stratification, is supporting the development of diversity across our communities through the multiple opportunities offered by technology:
"We are at a pivotal moment in the evolution of technology and education. Technologies can now be easily designed to embrace different ways of knowing, inviting diverse learners to express and develop multiple points of view."

(Brunner and Bennett, 1997, p. 50)

Whether as a society, New Zealand is able to build a knowledge economy through developing learning communities that enable all students, of every ethnicity, girls and boys, rich and poor, to become proficient in technology depends as much on the underlying market stratification of schools as it does on what teachers are able to do. The early signs are that our primary schools are exacerbating a stratification process.

Social Studies raises some of the profoundest questions about gendered stratification, social class stratification and stratification by ethnicity, particularly for Māori girls and boys in our schools. Currently, social studies, which should arguably be the central site for critical reflection on cultural processes, is one of the key tools enacting stratification in schooling. This stratification effect is particularly marked for Māori in mainstream social studies. How ironic that such a stratification effect is apparent in the curriculum area charged with helping students to understand ‘the contribution of culture and heritage to identity, the nature and consequences of cultural interaction’, and ‘their rights, roles and responsibilities’ as they ‘learn to participate in society as informed, confident and responsible citizens’ (Ministry of Education, 1997, p. 11)

As was apparent in the research reviewed in Chapter 10, good intentions in the educational rhetoric are not consistent with the reality of social studies curriculum enactment for girls and boys of different ethnicities and different socio-cultural positionings.

The curriculum area of Health and Physical Education is a site potentially contributing to traditionally gendered notions of physical activity, sexuality and health in relation to masculinity and femininity. Results of the National Education Monitoring Project attitude survey of health and physical education suggest that girls and boys from early in their school career receive messages about gender appropriate activities and interests. While there were gender differences favouring both boys and girls in physical education tasks, boys were more positive about physical activities. Girls, on the other hand, were more interested in health, and performed better on items related to relationships.

Given persuasive explanations linking dominant definitions of masculinity and femininity to more negative health and interpersonal outcomes of boys, and concerns about body and harassment for girls, this stratification of attitudes and achievement in the curriculum is an area of concern. Research-based and evaluated implementation of the Health and Physical Education Curriculum provides a strategy for intervention and reflection in these processes.

Theoretically informed research, examining behaviour in primary and secondary schools collectively, indicates that schools and students, and the communities in which they participate, are implicated in producing a range of masculinities and femininities. How these gendered positions are articulated is generally specific to the local context. However, similarities have emerged across studies; for example, the culturally authoritative form of masculinity (hegemonic masculinity) is often bolstered by key competitive sports, and defined by social practices that denigrate femininity (eg, sexual harassment), also subordinating other masculinities (eg, homophobia). In short, different versions of masculinity and femininity are defined in hierarchical relation to each other, and intersect with discourses that define acceptable and unacceptable sexuality. For boys, ‘doing’ hegemonic masculinity can put them in physical danger, and cause problems for girls and others in their environment, but nevertheless ensure their status as ‘real men’. For girls, enacting femininity/ies can narrowly constrain ‘acceptable body’ and sexual and social behaviour. To address ‘problem behaviour’, and produce
positive social relationships, dominant and constraining forms of masculinity and femininity need to be critiqued, and alternative ways of being masculine and feminine opened up.

The evidence from the research indicates that being gay is still one of the deepest transgressions a boy commits in New Zealand schooling. The silence about lesbian and other sexualities in schooling reflects how deeply such constraints lie. (Vincent and Ballard, 1999) As is apparent in the words of a necessarily anonymous student, the policing of heteronormativity is not linked to the reality of who these students are.

“If the concept of what a ‘lesbian’ is was expressed as it really is and not what the ‘stereotype lesbian’ is then others would be able to face it more.’

(anonymous seventh form student; cited in Quinlivan, forthcoming)

The National Administration Guidelines (5) demand that Boards of Trustees provide safe physical and emotional environments for the students in our schools. Clearly, the research suggests that as a nation we are not making such provisions for gay and lesbian students. The use of gay/straight alliances to build communities of support, where difference is valued, not vilified, has been a strategy implemented in New Zealand schools out of lessons learned from overseas experiences. Recently an incident occurred at Cashmere High School in Christchurch: a girl was slashed with a craft knife by another girl because she dared to belong to a gay/straight alliance. This reported incident provided a vivid example of what lurks below the surface of a homophobic society. When such incidents rise to the surface, they illustrate the growing realisation that issues of gayness and identity have been implicated as one of the factors influencing youth suicide.

All students are influenced by heteronormative practices that depend for their power on the undervaluing of the female. However, heteronormative practices are by no means the only practices that constrain males to behave in particular ways. As Norris (1999) observed, ‘doing’ masculinity is not easy for new entrants:

‘Right from the start, the young German shepherd was hard to control, and obviously unused to children. The dog began growling and then sprang at a boy, as if to bite him: There is a chorus of “He’s just being friendly” by parents and staff gathered — an open denial it seems to me of the boy’s distress. The boy is crying and very afraid.’

(Norris, 1999, p.104)

12.5 PATTERNS OF GENDER DOMINANCE IN CLASSROOM AND SCHOOL PROCESSES

One of the strongest and most consistent findings of gender bias is that some boys tend to dominate the public verbal space in classrooms, and the physical space in playgrounds. The gender bias is most marked in social studies overall, but Nairn (1991) found that some teachers and students created contexts in geography classrooms in which girls were dominant. Jones (1991) demonstrated that the nature of public participation is as critical as the prevalence of such participation. Many researchers have linked the pattern of males receiving more teacher attention, asking more questions, being more disruptive, and shaming and humiliating girls who participate, to particular forms of hegemonic masculinity. Holmes’ (1997) review findings suggest that patterns of verbal dominance in classroom interaction reflect patterns in the wider New Zealand society, where males predominate in verbal interactions in New Zealand homes and workplaces. Australian research suggests that males are being enculturated into boardroom talk, while girls are doing ‘good’ and diligent student practices through their writing. An exception to the overall pattern was the classroom interaction patterns in Māori immersion programmes. These suggest quite a different gender dynamic working within environments, where interaction patterns appear to support both Māori boys and Māori girls (Carkeek,
Davies & Irwin, 1994). However, these researchers also found considerable variability linked to a teacher effect. Nairn (1991) called for attention to the quiet girls and boys.

Town (1998) found that some gay boys used silence as a strategy to manage their participation in educational contexts, where their very existence was a transgression. There has been insufficient consideration of the range of experiences of quiet students of different ethnicities. There has also been insufficient attention to intersections of de/masculinity, femininity and disability as was evident in the example given in Chapter 10, where a nine year old boy with spina bifida was taunted by a five year old girl.

Although there have been serious considerations of the ways in which classroom interaction patterns relate to learning, the links are complex and much further qualitative research is needed in this area, to show the kinds of patterns evident across schooling contexts, and the situated and relational nature of interaction.

12.6 PEDAGOGICAL STRATEGIES TO ADDRESS GENDER

As we foreshadowed in our Introduction the review itself, and in particular the Curriculum and Gendered Behaviour in Schools chapters, have been designed to provide a direct resource for professional development for teachers and teacher educators. Our hope is that the reader will be able to use and critique the theoretical tools, to explain the literature, and to develop appropriate policies and practices in specific contexts in New Zealand. We have written these within a narrative structure to make both the theory and the specific content accessible. In the Implications, we have indicated a need for informed dialogue on issues of gender, sexuality and diversity that takes up the iterative process of research-based dialogue, development and critique that has been evident in Australian gender work in education.

The specific strategies, which we have reported at length and summarized in each chapter, provide a wealth of pedagogical suggestions in each curricula area. The integration of technology and arts provides exciting opportunities for teachers to revalue the arts and make technology meaningful and accessible — although British experiences caution that boys can take up exclusive access to technology in music, unless teachers attend to gendered processes influencing participation. Critical literacy offers teachers and students ways of deconstructing the binary forms in language that constrain gendered regimes within our thinking and action.

The use of journaling in mathematics and writing in science gives access to explicit metacognitive strategies (Prain and Hand, 1996). Training in collaborative group processes and exploratory talk in science enables deep cognitive processing of curriculum content. Gender-neutral approaches that sanitize language and deny gendered relations do not appear to work throughout the literature. Effective approaches give students the tools to engage critically with gender issues within mainstream curriculum rather than as an added extra that the mainstream curriculum, can undermine or contradict.

Post-structural approaches have provided key strategies, such as deconstructing the unitary identity of male or female that is so often presented in curriculum. When society gives more information to its boys and girls about the academic achievements of its rugby heroes and the heroic exploits of the gay men who have shaped history, then the kinds of masculinist images that restrict boys’ positionings are fractured. When diverse women are included in implicit ways within the curriculum to meet mainstream instructional goals, then boys and girls are enabled to develop respect and admiration for individual women whose positionings in the world are also more complex than traditional images allow (nurturing and adventurous; kind and strong, mother and field leader). Post-structural approaches show sexist resources have interesting and authentic information about the gendered construction of the world. This strategy is only viable, however, if alternative varied and strong images of diverse women are integral to the development of curriculum resources. As the internet is used
increasingly as a vehicle for resource access, so the capacity of teachers to help students critically evaluate and deconstruct incoming information will be a key factor in the quality of learning. Teacher action research is the key strategy, in a field where unintended outcomes abound. Effective practice needs to be designed to meet the needs of specific groups of students within specific contexts.

The significance of curriculum as a context draws on social constructionist and post-structural theories of gender. However, essentialist theories are prevalent in New Zealand discourses. Emphasis is being given to students’ essential learning styles. Throughout our review of the literature, studies that attempted to demonstrate essential learning styles found other variables such as student experiences, resource access, and the cultural match between curriculum and student, to be much stronger explanatory mechanisms than style. All students learn more effectively when given sufficient access to curriculum, when new ideas are linked to their existing knowledges, when genres and ways of making meaning are made transparent, and when they are assisted to develop the metacognitive and information-processing skills to assist them to be active learners.

There are dangers in the use of essentialist assumptions about the learning styles of Māori children or Pacific children. Members of our Advisory Committee variously commented upon the problematic essentialist assumptions that suggest Māori children might not use their brains to learn like other children, or Pacific children should have choices to disengage with the curriculum because they have a more ‘rhythmic style’.

Nonetheless, the concept of ‘learning style’ has become a widely used, and seemingly useful tool for New Zealand educators. In the literature learning style variously references a wide range of pedagogical strategies and media, through which students might process new information. ‘Cooperative learning’ has been called a learning style rather than a social context for learning. The use of graphs has been suggested to be a preferred learning style, but the use of visual forms, especially diagrammatic representations, has been shown to assist all learners to see and interpret summary information effectively.

Any strategy that encourages and enables teachers to provide more effective opportunities for students to learn is useful. However, the adoption of essentialist discourses about the learning styles of girls and boys can emphasise the gendered binaries that constitute girls and boys as opposite, rather than gendered learners with shared and multiple experiences and strengths. Similarly, strategies that separate girls and boys can also enforce the binaries without enhancing learning.

Such strategies are often used by educators to create micro-cultural environments that enable a focus on one gender – and these strategies have been used more frequently with girls and boys in New Zealand education over recent years, at the same time being subject to new market influences (eg, Tracey, 1999; Watson, 1997). Also, the failure to manage the worst effects of behaviour that is integrally implicated in disruption, violence and harassment can lead girls to seek a safer physical and emotional environment.

What is apparent to us is that there needs to be more critical thinking on the part of educators, researchers and teachers about their use of language about difference. Considerations of ‘style’ can help teachers better to develop understandings of the ways in which ethnicity, gender, social class and sexuality are implicated in socio-cultural and educational regimes and practices. Such considerations can also contribute to alternative gender-neutral discourses about individuals (eg, in literacy), which deny the gendered nature of educational processes, ignore the centrality of gender to identity, and fail to enable a broader range of possibilities for girls and boys.

At the heart of gender difference is the issue of the nature of difference and its educational implications. As we reviewed this literature, we found the theoretical arguments about the construction of gender, masculinities, femininities, and heteronormative practices, to become increasingly more
powerful. Post-structural tools helped us to see ways of generating relational theories for understanding the active rate of the student and student agency in negotiating gendered identities. The post-structural tools of deconstruction do offer more effective ways to address the problems of violence and harassment underpinning gendered practices. But the research revealed also that for children, the construction of gendered identity is as critical to well-being as the deconstruction of binaries and constraints that limit educational possibilities. Through research and theory grounded in practice, educators may be able to put more emphasis on the valuing of masculinities, and the valuing of femininities, in educational practice. At the end of the school day, what works are policies and practices that facilitate children’s opportunities, learning and well-being.

12.7 EFFECTIVE EDUCATIONAL PRACTICE

What is evident throughout the review is the finding, perhaps best exemplified in Chapter Four focused on science teaching, that good teaching is fundamental to equitable practice. The most effective programmes, developed to address issues of equity, attend to issues of gender and culture integrally, but also draw upon the best research-based understandings available about effective teaching and learning. Nuthall (1999) identifies five characteristics of effective learning environments, arising out of the research on classrooms as effective learning communities. These include:

1) Transparent goals that relate to the interests and motivations of students.

2) A known relationship to other cultural contexts in which students are socialized.

3) A set of component activities that mirror the unconscious knowledge acquisition processes that constitute working memory.

4) Tasks that increase levels of trust, acceptance, sharing and mutual support between students.

5) A wide variety of curriculum relevant tasks that disrupt hierarchies developing between students, and enable diverse valuing of student knowledges and skills.

Nuthall (1999) points out that:

‘Because ... classrooms are embedded in the culture of their surrounding communities, lasting reform of classroom practices must take place both inside and outside the classroom, simultaneously and interactively. This means at the very least, a free flow of information and understanding between teachers and parents, and between adults and students.’ (p.249)

Darling-Hammond (1997) highlights the move towards diverse learning communities in US best practice:

‘In the past, most school systems responded to greater student diversity by separating newcomers from the mainstream through pullout programs, and more rigid tracking mechanisms. Rather than effectively educating the different groups, however, this strategy has created competition for scarce resources and a highly stratified, increasingly segregated, and sometimes hostile environment. Over time, this approach has worsened inter-group tensions and reduced and eroded community stability ... Instead of stratifying and rationing curriculum in relation to diversity, a growing number of schools are working to create intellectually challenging programs that are enriched by diverse perspectives and responsive to a variety of approaches.’ (p.98)
Rothenberg, McDermott and Martin (1998) report more student-centred, interactive classes, use of cooperative group work, higher order thinking, and critical thinking in heterogeneous classes.

While it has been evident, in the development of the National Education Monitoring Project, and recent assessment initiatives in the Ministry of Education, that assessment is a major educational strategy, the research reviewed does not feature assessment as a strategy to address issues of gender and equity. Rather, assessment and rating processes are themselves implicated in gender bias, requiring teachers to be knowledgeable about the cultural dimensions of assessment practices (Willingham & Cole, 1997). Except in the case of formative assessment, assessment per se is not a strategy that increases student performance. Weighing the cow repeatedly does not increase the milk produced, just as pulling a plant up by the roots to assess growth regularly hinders development. McKinley (1999) reviewed research showing such effects on minority students. What is apparent is that the National Education Monitoring Project has produced national assessment findings that raise serious cause for concern. The question arises, then: ‘What development processes will follow from the patterns of differential performance by gender, ethnicity and school decile level?’

12.8 TEACHERS AND TEACHER EDUCATION

As was apparent throughout Chapter Three, and in the consideration of research reviewed, the key resource in the gender debate is the teacher. Hargreaves (1994) pointed out that ‘there is little significant school development without teacher development’ (p.436). The teacher’s own expertise in subject knowledge and pedagogy across the curriculum is critical (Darling-Hammond, 1998; Elley, 1992; Smith, 1999; Wagemaker, 1993). The research reviewed across curricula areas, and notably in the IEA literacy study, indicates that quality teacher education is critical to, and the most cost-effective resourcing of, effective educational practice. The permeation of critical considerations of gender and culture throughout teacher education, and throughout the links between theory and practice in such programmes, is essential. The Education Review Office (October, 1999) has just concluded that graduates may not have either the subject matter knowledge or the pedagogical knowledge necessary. That review signalled that the issue of preparing teachers to teach both genders requires further consideration.

Our review suggests that teacher specialist subject knowledge should ideally encompass both subjects traditionally positioned as feminine and subjects traditionally positioned as masculine. The teachers’ understandings of cultural and gendered difference and processes are instrumental in the way curriculum is enacted. Given access to theoretical tools to deconstruct and interpret gendered practices in localised contexts, teachers can generate and evaluate with students multiple strategic responses. Teacher networks, which so often work within curriculum through the curriculum-based professional organisations, may need themselves to engage in cross-curricula ‘confoundings’, to establish dialogue about curriculum integration that addresses issues of gender in literacy, arts, technology, mathematics, science and related areas. Further, while engaged in such an endeavour, and given an ongoing dialogue with colleagues, teacher-researchers, researchers and communities, teachers themselves will continue to generate new understandings about the implications of gendered regimes for educational practice. Such understandings can contribute to more informed debate about gender in educational and wider communities.

Our review of the literature repeatedly shows Māori, and Pacific students particularly, to be on average performing more poorly. In the New Zealand context, teacher education programmes must ensure that issues of ethnicity, culture (encompassing social class culture) and gender permeate the programmes and theory to practice links. Many of the research studies and reviews we have addressed within the body of the review have linked gender and ethnicity issues in teacher education.
The national and international literature has recently and increasingly addressed the finding of teachers’ lack of sensitivity to or understanding of issues of gender or ethnicity (Birrell, 1995; Davis, 1995; Duesterberg, 1998; Ennis, 1998; Jones, forthcoming; Lorrrigan, 1991; Smolkin and Suina, 1999). Greenleaf, Hull and Reilly (1994) found that transformations were needed in pre-service teachers’ notions of ability and difference, and illustrated a strategy to use learning cases in US teacher education. Hickling-Hudson and McMenamin (1993) suggest permutation to be the most effective approach, but not a strategy that has been evident in Australian teacher education. Rather, multicultural issues were dealt with through a token approach. Noordhoff and Kleinfield (1993) provided opportunities in teacher education for pre-service teachers to learn from communities, and to design instruction that made explicit links to students’ diverse experiences. Cazden (1990) found that New Zealand junior school in-service teachers did not take up with Māori students issues arising out of an intervention involving literacy tasks.

12.9 THE ROLE OF AND POSSIBILITIES FOR RESEARCH

We foreshadowed in the introduction our perception that the research itself would make transparent the value of research for informing educational practice. What is evident is not only the power to inform that the major research studies offer, but also the role played by small-scale teacher research (eg, Haynes, 1997). This review reveals the valuable contribution made by the situated small scale studies of teacher-researchers that address issues of development in context. When there is a venue for publication, or network, within which such research can be disseminated, debated and built upon, teacher research becomes an integral part of overall development within the educational community.

The possibilities for research training and research funding have diminished over the decade. Teacher education has moved away from the umbrella of an Education Act that requires research and teaching to be interdependent. Even when it has remained under such a legislative umbrella, the separation of research and teaching policies constrain teacher educators through time and resources. The Teacher Affiliateship scheme, which provided the platform for many teachers to investigate equity issues, no longer exists, and the possibilities for research questions to emerge from the schools themselves have diminished. Although the education system is seen by the Minister for Information Technology’s Advisory Group (1999) to be critical to the development of a knowledge economy, the new Public Good Science Fund has released its set of Strategic Portfolio Outlines, in which education is subsumed only under general categories of Peoples of Aotearoa/New Zealand, Families and Communities, Public Life. Education as a low status sector competes for funds within society, so it follows that the lack of specific targeting of educational research will diminish funding.

Gender will continue to be a fluid influence in education as society changes ever more quickly. The extent to which gender will be critically and effectively addressed in educational practice will depend on the research that is possible. To date much of the research base has been imported. But what is happening in our schools for Māori, Pacific, low decile students, girls and boys of different cultural positionings and communities? New Zealand teachers need to know what is happening in New Zealand schools and communities. Answering the questions is just one function of research. That the questions are asked, and educational communities engage with those questions, are significant actions in the reflexive development process. Too often discourses about gender have been fossilized in entrenched positions. When the debate that occurs is informed by research or reflection on evidence, then what we are doing is genuinely educational.

12.10 IMPLICATIONS

Specific implications for policy, practice and research have been identified and made explicit throughout the body of this review of the research literature on gender differences. Because the findings of the review reveal different groups of girls and boys to variously achieve or perform more
highly in different areas of the curriculum and at different levels of compulsory schooling, many of the implications are specific to particular curricular areas and sectors and educators are referred to the summary boxes in each curriculum chapter for detailed strategies arising out of the literature. The following is a summary of twelve general implications of the review for addressing issues of gender difference in schooling.

1. **The Need for Informed Dialogue**

The findings of this review, and the evidence of the myths that abound in considerations of gender, indicate a need to develop an informed dialogue within the profession and the community about gender issues in educational practice and, in particular, about some of the issues raised, findings from, and gaps in the literature identified in this report. Such dialogue would enable educators and curriculum leaders to respond to, critique and develop the review findings in the light of their own contexts, research, experiences and understandings of gendered regimes and practices in New Zealand.

2. **The Need to Consider the Inter-relationships Amongst Gender, Ethnicity, Social Class and Sexuality. Which Girls and Which Boys?**

Evidence from this review demonstrates the importance of attention to issues of gender, difference and equity. While a focus on gender is necessary in considering the needs of girls and boys, the research makes it clear that relational issues of gender, ethnicity, social class, sexuality and identity are inter-linked.

The patterns are complex. For example, there is a particularly low participation rate for Maori boys in senior school but on average those Maori boys who stay on for senior science perform above the international mean at school leaving age.

Relevant interrelationships should be addressed when considering priorities and implications for research, policy and practice.

3. **The Need to Address the Impact of School Choice Policies on Increased Achievement Gaps: Girls and Boys in Low Decile Schools.**

There is evidence in the review of increased stratification of students through schooling over the decade and its effects on girls and boys in low decile schools. That is, the review reveals that strategies in relation to school choice policies which were developed to close achievement gaps, are likely to have contributed to increased achievement gaps. One exception to this finding is evident in the positive environment experienced by girls and boys in Maori immersion programmes.

Policy strategies to address disparities for these students should take into account the school stratification effect. The evidence from this review can help to inform the kinds of strategies that will make a difference in the Closing the Gaps initiative and other initiatives to raise achievement.

4. **The Need to Develop, Sustain and Monitor Gender Policy**

In the past it has been acknowledged that the provision of policy advice about gender within the Ministry of Education has encountered difficulties. Approaches that focus on girls or boys rather than both boys and girls and the relational issues of gender, or approaches that have not been specifically resourced have been problematic.
Australian initiatives have produced a gender equity framework focused on heterogeneous groups of girls and boys. That policy framework includes attention to the role of gender in violence and school culture; and is supported by action plans, resource databases, outcome indicators and monitoring strategies. The review indicates the need for a New Zealand approach that supports the systematic development of gender policy. Approaches should ensure the accessibility of relevant advice, and establish accountability mechanisms to monitor the effectiveness of ongoing initiatives.

5. The Need to Address the Impact of Teacher Education on Student Achievement, Achievement Disparities and Gendered Practices

The international evidence indicates that classroom teachers have a far greater impact on the variation in student achievement scores than do schools. In addition, recent research indicates that gender differences in achievement are not attributable to single sex or coeducational school differences.

Student achievement is strongly related to the length and quality of pre-service and in-service teacher education. This relationship is evident in research across the curricular areas but the available evidence is particularly strong for literacy, mathematics, science and technology. The impact of relatively high workloads of primary and secondary teachers in New Zealand needs to be taken into consideration when implementing professional development.

While advanced teacher subject knowledge and pedagogical knowledge are shown to be particularly significant in influencing student achievement, the review shows the need for teacher education that also specifically and integrally addresses issues of gender, diversity and equity in both programmes and standards.

6. The Need for Effective Female and Male Teachers who are Well Qualified

International research, including a New Zealand sample, that investigates the relationship between teacher gender and the achievement of girls and boys indicates that countries with the highest literacy performances have higher proportions of female teachers. However, the relative achievement of girls and boys varies by curriculum area and school level rather than teacher gender. Higher proportions of women teachers teach both primary school literacy where girls achieve significantly more highly and primary school social studies where boys achieve significantly more highly.

Commentators writing in the area of gender make a strong case for the importance to girls and boys of both capable men and women as teachers. International comparisons show that countries with the lowest teacher salaries have the lowest national proportions of male teachers. The New Zealand primary service has particularly low levels of male teachers (21%) consistent with historically relatively low salary levels by international standards, although salary increases in recent years may change this. Contributing to the low proportion of male teachers in primary schools may be the perceived low status of the teaching profession in this country indicated in studies.

These findings suggest the need for policies that ensure well-qualified and capable women and men are attracted to and retained in teaching. Such policies are not only important for student achievement and well-being in schooling, but for their demonstrated influence on the key role of education in producing a knowledge economy.
7. The Need to Link Assessment Outcomes with Development Strategies

While the review indicates that national assessments have been a key strategy, assessment findings of themselves do not address the issues. Further, international and national research on assessment shows that gender bias can be as endemic to testing as to other areas of educational practice.

The review findings indicate the need for action plans and strategies to address disparities and areas of concern identified through assessment outcomes. Where national assessment results show marked patterns of poor performance in specific curriculum areas for girls and/or boys, particularly in relation to performance against international standards, priorities for actions should be established for those groups of girls and/or boys whose performance is lowest.

Such priorities should not necessarily be equated with gender gaps. For example, while there is a significant gender gap in our literacy performance on international comparisons at primary level, both boys and girls on average perform above the international mean. While there was no significant gender gap evident in primary students’ mathematics performance in the TIMSS study at Year 5, both New Zealand girls and boys on average achieved substantially below the international mean performance.

Similarly, the gender gap for New Zealand students in literacy exceeds gender gaps in science but the performance of New Zealand girls and boys in science at primary level is lowest of the English speaking countries, indicating that raising overall levels of science achievement is a priority.

8. The Need to Address the Gendered Curriculum

Because the curriculum structure is implicated in gender stratification, strategies to address gender differences should be developed in response to the particular findings for each curricular area.

The review evidence reveals that curriculum is strongly implicated in patterns of gendered stratification in participation and achievement in schooling. For example, boys have on average performed more poorly in English literacy and there is evidence that this pattern has been occurring for over 100 years in New Zealand schooling particularly at the primary level.

However, the results for secondary show complex outcomes. For example, international findings reviewed showed no significant difference in literacy performance in New Zealand for 14 year old boys and 14 year old girls, while the greatest gender difference for any subject appears to be girls’ higher average performance on national 6th form and bursary English results.

The research indicates that literacy practices have come to have strong gendered associations for students. English literacy is seen by boys to be a ‘girls’ subject’ and a ‘wuss’ or ‘girl’ option for boys. While boys predominate in oral discussions in classrooms reflecting patterns of dominance evident in the wider community, girls perform more highly on writing tasks.

These findings indicate that gender gaps in literacy reflect the gendered construction of curriculum and that an understanding of gendered processes is critical in addressing literacy performance. That the same boys who on average perform more poorly in literacy perform as well as girls on literacy tasks embedded in science, and more highly than girls in social
studies indicates that schools need to address the gendered nature of curriculum directly.

9. The Need to Develop Cross-Curricular and Integrated Curricular Strategies

The findings suggest the merit of giving emphasis to cross-curricular and integrated curricular strategies such as mathematics-language initiatives to confound traditional gendered associations and to enhance the learning of girls and boys across the curriculum.

Such a cross-curricular approach is particularly needed for the integration of technology with arts, literacy and social studies as well as with its more traditional associations with mathematics and science. One important implication of the review findings is that explicit focus should be placed upon issues of gender, social class, ethnicity and information skills across the curriculum.

10. The Need to Identify and Address Gender Practices in Schools and Communities that Constrain Student Opportunities

Parents and the wider community are implicated in gender stratification that restricts the opportunities for girls and boys. For example, parents are more likely to provide their sons rather than their daughters with access to computers. This pattern reflects and supports the greater access to computers some boys gain at school when resources are limited. Parents are more likely to provide their daughters than their sons with presents of books and opportunities to read. In-school initiatives need to increase opportunities for girls and boys and involve parents and communities in addressing gendered constraints on such opportunities.

11. The Need to Address Gendered Violence, to Provide Safe Educational Environments and to Affirm Diversity and Educational Possibilities. What Schools Can Do

Boys are over-represented in negative statistics such as suspensions and overt forms of bullying and violence at school. Boys are more likely to be the subject of disciplinary practices at school. In New Zealand, the rates of suicide for adolescent boys and attempted suicide rates of adolescent girls are exceptionally high by international standards.

The current authoritative form of masculinity in New Zealand culture (hegemonic masculinity) supports behaviours implicated in bullying and violence, belittles femininity and constrains other forms of masculinities. Restrictive and aggressive forms of masculinity, and the cultural belittling of female can have deleterious effects upon both girls and boys.

International and national findings show that schools are implicated in negative outcomes related to gender through channeling students into gender-appropriate subjects, supporting some school activities such as sports that are associated with aggressive forms of masculinity while ignoring others, failing to take sexual harassment and bullying of both male and female students seriously, using streaming practices that set some students up as successes or failures, and using disciplinary practices that do not emphasize personal responsibility and/or shaming boys by comparing them with girls.

Pedagogical strategies that directly address gender should be integrated into curriculum rather than additive, and should provide students with a safe environment to explore gender issues and affirm identity rather than criticize student’s identities with respect to gendered violence and social outcomes.

The review indicates that effective strategies are whole school approaches that incorporate a negotiated disciplinary policy that actively protects all groups of students, the use of
inclusive pedagogies and curricular content, the valuing of a variety of extra-curricular activities, and equipping students and staff with a range of personal and critical thinking skills.

An underpinning theme in the literature is the need to affirm diversity in our communities.

12. The Need for Research Both to Inform Policy and to Address Gender Issues Effectively in Context

The review indicates that research provides a valuable source of information about what is actually happening for different groups of girls and boys in educational contexts. Action research has also provided an effective strategy for addressing gender issues in practice sometimes achieving outstanding results.

However, much of the general and action research cited in this review is no longer occurring because of recent changes in teacher education and tertiary and social science research funding regimes. In addition there are substantial gaps in the New Zealand research, for example, Maori and science education and in particular, Pacific students and science education. Accordingly, the review implication is that research funding be allocated to support diverse local research and development projects that take up issues of gender, difference and education with attention to the relational frameworks within which masculinities and femininities are situated and the implications of these for educational practice.
Explain and Addressing Gender Differences
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