

**Quality Teaching for Diverse Students in Schooling:
Best Evidence Synthesis**

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This report is one of a series of best evidence syntheses commissioned by the Ministry of Education. It is part of a commitment to strengthen the evidence base that informs education policy and practice in New Zealand. It aims to contribute to an ongoing evidence-based discourse amongst policy makers, educators and researchers.

The best evidence synthesis approach is being developed in collaboration with researchers. It draws together in a systematic way the available evidence about what works to improve education outcomes, and what can make a bigger difference for the education of all our children and young people.

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Executive Summary

This best evidence synthesis *Quality teaching for diverse students in schooling* is intended to contribute to the development of our evidence-base for policy and practice in schooling. The purpose of the synthesis is to contribute to ongoing, evidence-based and evolving dialogue about pedagogy amongst policy makers, educators and researchers that can inform development and optimise outcomes for students in New Zealand schooling.

Quality teaching is identified as a key influence on high quality outcomes for diverse students. The evidence reveals that up to 59% of variance in student performance is attributable to differences between teachers and classes, while up to almost 21%, but generally less, is attributable to school level variables.

This best evidence synthesis has produced ten characteristics of quality teaching derived from a synthesis of research findings of evidence linked to student outcomes. The central professional challenge for teachers is to manage simultaneously the complexity of learning needs of diverse students.

The concept of 'diversity' is central to the synthesis. This frame rejects the notion of a 'normal' group and 'other' or minority groups of children and constitutes diversity and difference as central to the classroom endeavour and central to the focus of quality teaching in Aotearoa, New Zealand. It is fundamental to the approach taken to diversity in New Zealand education that it honours Articles 2 and 3 of the Treaty of Waitangi.

Diversity encompasses many characteristics including ethnicity, socio-economic background, home language, gender, special needs, disability, and giftedness. Teaching needs to be responsive to diversity within ethnic groups, for example, diversity within Pakeha, Māori, Pasifika and Asian students. We also need to recognise the diversity within individual students influenced by intersections of gender, cultural heritage(s), socio-economic background, and talent. Evidence shows teaching that is responsive to student diversity can have very positive impacts on low and high achievers at the same time. The ten characteristics are interdependent and draw upon evidence-based approaches that assist teachers to meet this challenge.

The ten research-based characteristics of quality teaching derived from the research are generic in that they reflect principles derived from research across the curriculum and for students across the range of schooling years in New Zealand (from age five to eighteen). How the principles apply in practice is, however, dependent on the curriculum area, and the experience, prior knowledge and needs of the learners in any particular context. The body of this synthesis provides examples from the research on learning and teaching to illustrate the principles for different curricular areas across schooling from junior primary to senior secondary classes.

The ten characteristics generated out of the synthesis are summarised below.

1. *Quality teaching is focused on student achievement (including social outcomes) and facilitates high standards of student outcomes for heterogeneous groups of students.*

Research-based characteristics

- Quality teaching is focussed on raising student achievement (including social outcomes).
- Quality teaching facilitates the learning of diverse students and raises achievement for all learners.
- The teacher establishes and follows through on appropriate expectations for learning outcomes and the pace at which learning should proceed.
- High expectations are necessary but not sufficient, and can be counterproductive, when not supported by quality teaching.

2. *Pedagogical practices enable classes and other learning groupings to work as caring, inclusive, and cohesive learning communities.*

The learning community concept has arisen out of the research literature and denotes both a central focus on learning and the interdependence of the social and the academic in optimising learning conditions.

Research-based characteristics

- Pedagogical practices create an environment that works as a learning community.
- Student motivation is optimised and students' aspirations are supported and extended.
- Caring and support is generated through the practices and interactions of teacher(s) and students.
- Pedagogical practices pro-actively value and address diversity.
- Academic norms are strong and not subverted by social norms.
- The language and practices of the classroom are inclusive of all students.
- Teachers use class sessions to value diversity, and to build community and cohesion.
- Teaching and tasks are structured to support, and students demonstrate, active learning orientations.
- Teaching includes specific training in collaborative group work with individual accountability mechanisms, and students demonstrate effective co-operative and social skills that enable group processes to facilitate learning for all participants.
- Students help each other with resource access and provide elaborated explanations.
- Pedagogical practice is appropriately responsive to the interdependence of socio-cultural and cognitive dimensions.

3. Effective links are created between school and other cultural contexts in which students are socialised, to facilitate learning.

Research-based characteristics

- Teachers ensure that student experiences of instruction have known relationships to other cultural contexts in which the students have been/are socialised.
 - Relevance is made transparent to students.
 - Cultural practices at school are made transparent and taught.
 - Ways of taking meaning from text, discourse, numbers or experience are made explicit.
 - Quality teaching recognises and builds on students' prior experiences and knowledge.
 - New information is linked to student experiences.
 - Student diversity is utilised effectively as a pedagogical resource.
- Quality teaching respects and affirms cultural identity (including gender identity) and optimises educational opportunities.
- Quality teaching effects are maximised when supported by effective school-home partnership practices focused on student learning. School-home partnerships that have shown the most positive impacts on student outcomes have student learning as their focus.
- When educators enable quality alignments in practices between teachers and parent/caregivers to support learning and skill development then student achievement can be optimised.
- Teachers can take agency in encouraging, scaffolding and enabling student-parent/caregiver dialogue around school learning.
- Quality homework can have particularly positive impacts on student learning. The effectiveness of the homework is particularly dependent upon the teacher's ability to construct, resource, scaffold and provide feedback upon appropriate homework tasks that support in-class learning for diverse students and do not unnecessarily fatigue and frustrate students.

4. Quality teaching is responsive to student learning processes.

Research-based characteristics are specific to curriculum context and the prior knowledge and experiences of the learners.

- Teachers have knowledge of the nature of student learning processes in the curriculum area, can interpret student behaviour in the light of this knowledge and are responsive, creative and effective in facilitating learning processes.
- Examples of teaching approaches that are intended to exemplify this characteristic are the dynamic or flexible literacy models, the numeracy strategy focus and the Interactive Teaching Approach in science education.
- Classroom management enables the teacher to be responsive to diverse learners.
- Responsive teaching is important for all learners and particularly critical for students with special needs.

5. Opportunity to learn is effective and sufficient.

Research-based characteristics

- Quality teaching provides sufficient and effective opportunity to learn.
- Management practices facilitate learning (rather than emphasising compliant behaviour or control).
- Curriculum enactment has coherence, interconnectedness and links are made to real life relevance.
- Curriculum content addresses diversity appropriately and effectively.
- Quality teaching includes and optimises the effective use of non-linguistic representations by teacher and students. (This assumes the concurrent and rich use of oral language and text as central to literacy across the curriculum.)
- Students have opportunities to resolve cognitive conflict.
- Students have sufficient and appropriate opportunities for practice and application.

6. Multiple task contexts support learning cycles.

Research-based characteristics

- Task cycles match developmental learning cycles of students.
- Task cycles enable students to engage in and complete learning processes so that what is learned is remembered.
- Optimal use is made of complementary combinations of teacher-directed groupings, co-operative groups, structured peer interaction and individual work (including homework) to facilitate learning cycles.

7. Curriculum goals, resources including ICT usage, task design, teaching and school practices are effectively aligned.

Research-based characteristics

- Curricular alignment: The use of resources, teaching materials and ICT is aligned with curriculum goals to optimise student motivation and accomplish instructional purposes and goals.
- Curricular alignment optimises rather than inhibits critical thinking.
- Pedagogical strategies are evaluated in relation to curricular goals.
- ICT usage is integrated into pedagogical practice across the curriculum.
- Quality teaching is optimised when there is whole school alignment around evidence-based practices.
- The school maintains an 'unrelenting focus on student achievement and learning'¹.
- There is whole school alignment and coherence across policies and practices that focus on, resource and support quality teaching for diverse students.
- Pro-active alignment across the school supports effective inclusion of diverse students within the school community.
- Whole school alignment optimises opportunity to learn, particularly in language immersion, literacy, ICT, social studies and health.
- Whole school alignment enables a common language, teacher collaboration and reflection and other synergies around improving teaching.
- Whole school alignment minimises disruptions to quality teaching and sustains continuous improvement.
- School policies and practices initiate, and support teachers in maintaining, school-home partnerships focused on learning.

8. Pedagogy scaffolds and provides appropriate feedback on students' task engagement.

Research-based characteristics

- Tasks and classroom interactions provide scaffolds to facilitate student learning (the teacher provides whatever assistance diverse students need to enable them to engage in learning activities productively, for example, teacher use of prompts, questions, and appropriate resources including social resources).
- Teaching develops all students' information skills and ensures students' ready access to resources when needed to assist the learning process.
- Students receive effective, specific, appropriately frequent, positive and responsive feedback. Feedback must be neither too infrequent so that a student does not receive appropriate feedback nor too frequent so that the learning process is subverted.

¹ Hopkins, D. (2001). *School improvement for real*. London: Routledge. (p. 185).

9. Pedagogy promotes learning orientations, student self-regulation, metacognitive strategies and thoughtful student discourse

Research-based characteristics

- Quality teaching promotes learning orientations and student self-regulation.
- Teaching promotes metacognitive strategy use (e.g. mental strategies in numeracy) by all students.
- Teaching scaffolds reciprocal or alternating tuakana teina² roles in student group, or interactive work.
- Teaching promotes sustained thoughtfulness (e.g. through questioning approaches, wait-time, and the provision of opportunities for application and invention).
- Teaching promotes critical thinking.
- Teaching makes transparent to students the links between strategic effort and accomplishment.

10. Teachers and students engage constructively in goal-oriented assessment.

Research-based characteristics

- Assessment practices improve learning.
- Teachers and students have clear information about learning outcomes.
- Students have a strong sense of involvement in the process of setting specific learning goals.
- Pedagogy scaffolds and provides appropriate feedback on students' task engagement.
- Teachers ensure that their assessment practices impact positively on students' motivation.
- Teachers manage the evaluative climate, particularly in context of public discussion, so that student covert or overt participation is supported, scaffolded and challenged without students being humiliated.
- Teachers manage the evaluative climate so that academic norms are not undermined but supported by social norms.
- Teachers adjust their teaching to take account of the results of assessment.

² See Royal Tangaere, A. (1997). Māori human development learning theory. In P. Te Whaiti, M. McCarthy & A. Durie (Eds.), *Mai I Rangitaatea Māori well-being and development*. Auckland: Auckland University Press with Bridget Williams Books. Derived from older sibling (tuakana) and younger sibling (teina). A practice where 'the learner ... shifts roles and become(s) the teacher, and for the teacher to become the learner... The concept of tuakana/teina also operates through the dual nature of ako. The word ako means to learn as well as to teach.' (p. 50).

1. Introduction

This best evidence synthesis brings together the findings about what works as quality teaching in primary, intermediate and secondary schooling. Ten characteristics of quality teaching have been derived from an analysis of the evidence about practices that facilitate high achievement and reduce disparities amongst diverse students.

Quality teaching is defined as 'pedagogical practices that facilitate for heterogeneous³ groups of students their access to information, and ability to engage in classroom activities and tasks in ways that facilitate learning related to curriculum goals'.^{4,5} The term 'teaching' is used for simplicity but the term 'pedagogy'⁶ is also used throughout the synthesis. The wider focus on pedagogy ensures a broad consideration of the range of ways in which quality teaching is accomplished, for example, through culturally inclusive and pedagogically effective task design, through managing resource access for diverse learners, through equipping students with skills for self-regulation, and through training students in specific peer teaching strategies. The term 'teaching' has too often led to a narrow focus on the interaction between teacher and learner. The public interactions between teachers and learners are undoubtedly very important. But the direct interaction between teacher and students is likely to be just the tip of the iceberg. High achievement for diverse groups of learners is an outcome of the skilled and cumulative pedagogical actions of a teacher in creating and optimising an effective learning environment.

This synthesis focuses on students in class groupings in schooling. Another synthesis commissioned by the Ministry of Education focuses on our best evidence about quality teaching for early childhood education⁷. The *Quality Teaching- Early Foundations* synthesis provides an invaluable companion to the schooling synthesis.

This best evidence synthesis is intended to contribute to the development of our evidence-base for policy and practice in schooling. The purpose of the synthesis is to contribute to ongoing informed and evolving dialogue amongst policy makers, educators and researchers in order to optimise outcomes for students in New Zealand schooling.

The ten research-based characteristics of quality teaching derived from the research are generic in that they reflect principles derived from research across the curriculum and for students across the range of schooling years in New Zealand (from age five to eighteen). How the principles apply in practice is, however, dependent on the curriculum area, and the experience, prior knowledge and needs of the learners in any particular context. The body of this synthesis provides examples from the research on learning and teaching to illustrate the principles for different curricular areas at different levels of schooling.

3 Heterogeneous includes the diversity of students in any educational setting, including the overall diversity of New Zealand students. While some class groupings within schools are more homogeneous by achievement level, gender, socio-economic status of families and ethnicity than others, the principle of heterogeneity recognises that difference is a characteristic of any group of students.

4 Alton-Lee, A., & Nuthall, G. (1998). *Inclusive instructional design: Theoretical principles emerging from the Understanding Learning and Teaching Project*. Report to the Ministry of Education. Wellington: Ministry of Education.

5 This definition anticipates Brophy's (2001) elaboration of effective teaching that informed this synthesis. The definition explicitly addresses the heterogeneity of New Zealand students, and draws upon the landmark definition of teacher effectiveness from Dunkin M., and Biddle B. (1974). *The Study of Teaching*. New York: Holt, Rinehart & Winston:

'There seems to be no more obvious truth than that a teacher is effective to the extent that he (sic) causes pupils to learn what they are supposed to learn. (p. 14)

6 The term 'pedagogy' is derived from the Greek *agōgos* meaning 'to guide'. The term is commonly used to denote the science, or more appropriately, the social science of teaching. This contrasts with a view of teaching as only a craft knowledge. The term 'pedagogy' is used here because of the focus on an evidence base for teaching and for the reasons given in the introductory section above.

7 Farquhar, S. (2003). *Quality Teaching - Early Foundations: Best evidence synthesis*. Report prepared for the Ministry of Education. Wellington: Ministry of Education.

The research included in this synthesis has been selected because it provides evidence of links between teaching, learning processes and student outcomes.

Section 2 of this synthesis highlights the evidence about the importance of quality teaching as a key system influence for raising achievement and reducing disparity. Section 3 emphasises the increasing heterogeneity of the students in our schools and the need for quality teaching to be responsive to diverse students. Section 4 briefly outlines the range of academic and social outcomes considered in this synthesis. Section 5 provides a consideration of the inherent problems, challenges and tensions surrounding the use of indicators of quality teaching, and the contribution this synthesis can and can't make to improving practice. Section 6 addresses the scope of the synthesis, and the best evidence synthesis approach taken. This section also explores strategies that could be used to strengthen the work through future development.

Section 7, the body of the synthesis, draws on examples of New Zealand and international research on teaching that includes evidence linked to student outcomes that generated the ten characteristics. Section 8 provides a summary of the evidence. The final section (Section 9) highlights the purposes of the synthesis. Section 9 also emphasises the status of this best evidence synthesis as a stage in an ongoing and iterative process designed to improve the evidence base for policy, practice and research and to contribute to informed dialogue about what works for diverse students.

2. Quality Teaching as the Key System Influence

Quality teaching has a key role because from within the education system, and in partnership with parents and caregivers, it is the most influential point of leverage on student outcomes. Quality teaching influences the quality of student participation, involvement and achievement (including social outcomes).

Our best evidence internationally is that what happens in classrooms through quality teaching and through the quality of the learning environment generated by the teacher and the students, is the key variable in explaining up to 59%, or even more, of the variance in student scores. This finding of the far greater magnitude of influence on outcomes of teachers and classes than schools has been evident for different outcome measures and different educational systems across a range of studies and countries (Cuttance, 1998⁸; Cuttance, 2001⁹; Hanushek, Kain, & Rivkin, 1998¹⁰; Hill & Rowe, 1996¹¹, 2002¹²; Kyriades, Campbell, & Gagatsis, 2000¹³; Ministry of Education, 2001¹⁴; Rowe, Turner, & Lane, 1999¹⁵; Scheerens, Vermeulen, & Pelgrum, 1989¹⁶; and Willms, 2000¹⁷).

8 'Recent research on the impact of schools on student learning leads to the conclusion that 8-9% of the variation in student learning outcomes lies between schools, with a further amount of up to 55% of the variation in individual learning outcomes between classrooms within schools.' (p.1158). Cuttance, P. (1998). Quality assurance reviews as a catalyst for school improvement in Australia. In A. Hargreaves, A. Lieberman, M. Fullan., & Hopkins, D. (1998). *International Handbook of Educational Change (Part Two)* pp. 1135-1162. Dordrecht: Kluwer Publishers.

9 Cuttance, P. (2001). *The impact of teaching on student learning*. Australian College of Education Yearbook 2000. Australian College of Education: Canberra.

10 Hanushek, E.A., Kain, J. F., Rivkin, S.G. (1998). *Teachers, schools and academic achievement*. NBER Working Paper No. w6691. <http://papers.nber.org/papers/w6691>.

11 Hill, P., & Rowe, K. (1996). Multilevel modelling in school effectiveness research. *School Effectiveness and School Improvement*, 7(1), 1-34.

12 Rowe, K. (2002). *Girls' and boys' learning experiences and outcomes of schooling throughout their primary and secondary years: Examining the evidence for what matters and the strategies for what works*. Background paper to a keynote address presented at the Diocesan Principals' Conference, Longreach, Queensland, April 18.

13 Kyriades, L., Campbell, R.J., Gagatsis, A. (2000). The significance of the classroom effect in primary schools: An application of Creemers' comprehensive model of educational effectiveness. *School Effectiveness and School Improvement*, 11 (4), 501-529.

14 Ministry of Education (2001). *Assessing knowledge and skills for life: First results from the Programme for International Student Assessment (PISA 2000) New Zealand Summary Report*. Wellington: Ministry of Education. For the Year 11 PISA results in reading literacy only 16% of the variance was accounted for by differences between schools. The summary concludes: 'In New Zealand, Australia and Norway, most of the variation is explained by differences in performance within the school.' (p. 10). Steve May, Manager, Comparative Education Research Unit found the actual between school variance for New Zealand students on this literacy measure to be particularly low at about 6-7%.

15 Rowe, K.J., Turner, R., & Lane, K. (1999). The 'myth' of school effectiveness: *Locating and estimating the magnitudes of major sources of variation in students' Year 12 achievements within and between schools over five years*. Paper presented at the 1999 AARE-NZARE Joint Conference of the Australian and New Zealand Associations for Research in Education, Melbourne Convention Centre, November 29-December 2, 1999.

16 Scheerens, J., Vermeulen, C., & Pelgrum, W.J. (1989). Generalizability of instructional and school effectiveness indicators across nations. *International Journal of Educational Research*, 13(7), 789-799.

17 Willms, J. D. (2000). Monitoring school performance for standards based reform. *Evaluation and Research in Education*, 14, 237-253.

The available New Zealand evidence shows school level effects to vary from accounting for 5% of the variance in student scores to 20.9% of the variance for different curricular areas. Harker and Nash (1996)¹⁸ found school effects to account for 5 to 10 % of the variance in mathematics, 5 to 7% of the variance in science and 9 to 10% of the variance in English when school certificate achievement was used as an outcome measure. The Smithfield study¹⁹ found 20.9% of the variance in mathematics achievement and 16.4% of the variance in English and science to be attributable to school level variables. In the Smithfield study it may be that the relatively high school effects reflect the policy of some schools of holding their lower achievers back from sitting the school certificate examination until their 6th form year. Harker and Nash (1996) initially went back in the sixth form year to include the results of those students who had been held back from sitting the exam. When Harker (1995) reanalysed the Harker and Nash data using the Smithfield approach their findings showed a much larger and comparable school effect, accounting for 18.2% of the variance in Maths, 14.3% in Science, and 14.6% in English.

There has only been one New Zealand study located for this synthesis that has provided in published form a multi-level analysis of both teacher/class within school variance and between school variance. That is the Second International Mathematics Study. Schereens, Vermeulen and Pelgrum (1989)²⁰ found the NZ between teacher/class variance to be 42% at the Year 9 level and the school effect to be undetectable as a source of variance for these first year secondary students. The lack of school effect may reflect the short time the students had spent in their secondary schooling (less than a year). However, the teacher effect was undeniable. A longitudinal study was carried out using a New Zealand sample from the Second International Mathematics Study in 1981. The SIMS sub-study showed that many of the high gain classes had very low pre-test scores showing a strong positive teacher effect despite the background and prior knowledge of the students. However, at the other end of the spectrum, this analysis showed Year 9 student achievement to decline or show zero gain over the year in 5 out of 199 classes. Garden, Wagemaker and Moody (1987)²¹ concluded a strong teacher effect from this secondary school data and explained for this New Zealand evidence that:

'schooling in mathematics does not necessarily result in the rich getting richer and the poor getting poorer'. (p. 260).

'classes with low mean socio-economic status, low pre-scores and higher proportions of non-Pakeha students are capable of very good progress in mathematics learning' (p. 319)

That study reflects the NZ context over two decades ago but is consistent with the PISA results for 2000. This recent evidence arises from the reading literacy findings of the Programme for International Student Achievement (PISA 2000)²². Although the PISA study did not investigate between teacher/class variance, the analysis showed New Zealand to have the highest within-school variance in student performance of the 32 participating countries and very low between-school variance comparatively. Using the PISA comparison, 11% of NZ within-school variance was explained by the socio-economic status of the school intake and students' families, suggesting a strong effect for teaching. It is noted with particular reference to NZ in the OCED Indicators 2002²³ that this finding suggests *'individual schools need to cater to a more diverse client base'* (p.85). Given the magnitude of teacher and classroom effect, and our diverse student population, the project of seeking to improve policy and practice through synthesising the evidence-base for quality teaching for diverse

18 Harker, R., & Nash, R. (1996). Academic outcomes and school effectiveness: type 'A' and type 'B' effects. *New Zealand Journal of Educational Studies*, 32, 143- 170. See also Nash, R., & Harker, R. K. (1997). *Progress at school: Final report to the Ministry of Education*. Palmerston North: Massey University, Educational Research and Development Centre.

19 Hughes, D., Lauder, H., Watson, S., Strathdee, R., Simiyu, I., Robinson, T., & Hamlin, J. (2000). *Do schools make a difference?: Hierarchical linear modelling of school certificate results in 23 schools The Smithfield Project- Phase 3. Eight report to the Ministry of Education*. Wellington: The Smithfield Project.

20 Scheerens, J, Vermeulen, C., & Pelgrum, W.J. (1989). Generalizability of instructional and school effectiveness indicators across nations. *International Journal of Educational Research*, 13(7), 789-799.

21 Garden, R., Wagemaker, H., & Mooney, C. (1987). Explaining mathematics achievement. In A. Binns, D. Carpenter, R. Elliffe, J. Irving, & N. McBride. (Eds.). *Mathematics achievement in New Zealand secondary schools*. Wellington: New Zealand Department of Education.

22 OECD (2001). Knowledge and skills for life: First results from PISA 2000. Programme for International Student Assessment. Paris: OECD. www.SourceOECD.org.

23 OECD (2002). *Education at a Glance OECD Indicators 2002*. Paris: OECD.

students, and developing access to, and use of, this knowledge, is a pressing one for New Zealand education.

Perhaps, because so much research on student achievement has been focussed at the school level (Cuttance, 1998²⁴; Hughes, Lauder, Watson, Strathdee, Simiyu, Robinson, & Hamlin, 2000²⁵; Nash & Harker, 1997²⁶; Wyatt, 1996²⁷), the finding that teacher and class effects are so substantial has only been prominent in the research literature quite recently. For example, after analysing the achievement scores of more than 100,000 students in a U.S study, Wright, Horn and Sanders (1997)²⁸ concluded:

The results of this study will document that the most important factor affecting student achievement is the teacher. In addition, the results show wide variation in effectiveness among teachers. The immediate and clear implication of this finding is that seemingly more can be done to improve education by improving the effectiveness of teachers than by any other single factor. (p.63)

Muijs and Reynolds (2001)²⁹ report from the British research:

All the evidence that has been generated in the school effectiveness research community shows that classrooms are far more important than schools in determining how children perform at school. (p. vii)

While this finding has been a relatively new understanding in the British research literature³⁰, the importance of teaching has been long-recognised in US research³¹. Over a quarter of a century ago Dunkin and Biddle (1974)³² reviewed 500 high quality studies selected from the over 10,000 published studies on teacher effectiveness available in the early 70s. In the recent 'International Handbook of Teachers and Teaching' Good, Biddle and Goodson (1997)³³⁻³⁴ emphasise the gains in knowledge about effective teaching arising out of the past 30 years and point out that since 1975:

'we have gained a good deal of convincing empirical evidence confirming large differences in the quality of instruction among teachers and classrooms and that these differences have significant impact on students' academic performance.' (p. 673)

The focus of this synthesis is quality teaching, particularly teaching in the context of class groupings. Further accompanying best evidence syntheses are being commissioned by the Ministry of Education

24 'Recent research on the impact of schools on student learning leads to the conclusion that 8-9% of the variation in student learning outcomes lies between schools, with a further amount of up to 55% of the variation in individual learning outcomes between classrooms within schools.' (p.1158). Cuttance, P. (1998). Quality assurance reviews as a catalyst for school improvement in Australia. In A. Hargreaves, A. Lieberman, M. Fullan., & Hopkins, D. (1998). *International Handbook of Educational Change (Part Two)* pp. 1135-1162. Dordrecht: Kluwer Publishers.

25 Hughes, D., Lauder, H., Watson, S., Strathdee, R., Simiyu, I., Robinson, T., & Hamlin, J. (2000). Do schools make a difference?: Hierarchical linear modelling of school certificate results in 23 schools The Smithfield Project- Phase 3. Eight report to the Ministry of Education. Wellington: The Smithfield Project.

26 Nash, R., & Harker, R. K. (1997). *Progress at school: Final report to the Ministry of Education*. Palmerston North: Massey University, Educational Research and Development Centre.

27 Wyatt, T. (1996). School effectiveness research: Dead end, damp squib or smouldering fuse? *Issues in Educational Research*, 6(1), 79-112.

28 Wright, S.P., Horn, S.P., & Sanders, W.L. (1997). Teacher and classroom context effects on student achievement: Implications for teacher evaluation. *Journal of Personnel Evaluation in Education*, 57-67 cited in Marzano, R., Pickering, D., & Pollock, J. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Virginia: Association for Supervision and Curriculum Development.

29 Muijs, D., & Reynolds, D. (2001). *Effective teaching: Evidence and practice*. London: Paul Chapman Publishing.

30 Muijs, D., & Reynolds, D. (2001). *Effective teaching: Evidence and practice*. London: Paul Chapman Publishing. These authors provide a detailed consideration for the English context of 'The absence of any national discourse about, and a strong research effort on, teacher effectiveness' (p. v11) and address 'The cost of our inability to address issues concerning teaching and the learning level (which) has been shown by those countries which do have this knowledge base intervening productively in children's lives' (p ix).

31 Darling-Hammond, L. (1998). Teachers and teaching: Testing policy hypotheses from a National Commission report. *Educational Researcher*, 27(1), 5-15.

32 Dunkin, M., & Biddle, B. (1974). *The study of teaching*. New York: Holt, Rinehart and Winston, Inc.

33 Biddle, B., Good, T., & Goodson, I. (Eds.). (1997). *International handbook of teachers and teaching*. Vol. 2. Dordrecht: Kluwer Academic Publishers.

34 In this recent Handbook Good, Biddle and Goodson (1997) point particularly to recent research that illuminates quality teaching through a focus on student mediation of classroom events, particularly student social cognition, student learning in small groups, student task literature, student self-regulated learning and student goal-regulation. Many findings from these recent traditions of research on effective teaching have been included in this synthesis, and it is intended that these more recent research traditions will inform future iterations of this work.

to inform our understanding of the influences on outcomes contributed by families and communities³⁵, initial teacher education, and professional development.

3. Quality Teaching for Diverse Students

'Another factor unfavourable to progress is the non-recognition of the essential heterogeneity of a collection of children... If they appear like one another today, they will appear unlike one another tomorrow.'
(Ballard, 1915, p. 16)³⁶

Classroom and other educational groupings of children or older students are always characterised by diversity or heterogeneity. The heterogeneity of any group of learners can be unpacked across many dimensions. For example, heterogeneity is a feature of the varied experiences the students bring to their learning of a particular topic, their previous achievement levels in relation to the topic or skill area, whether high, average, low or gifted, or their gender, families, and wider affiliations and heritages. Accordingly, quality teaching is necessarily a response to heterogeneous groups of students. Further, as captured in the quote cited above, and dating back to 1915, heterogeneity of class groupings is not a fixed characteristic. Rather, differences between students are fluid and changing and have different ramifications for each new teaching situation accordingly.

Quality teaching for heterogeneous groups of students, whether by ethnicity, socio-economic status of the student's homes, special educational needs, language background, gender or other differences, is a fundamental challenge for New Zealand schooling. For each individual student the intersection of social class, ethnicity and gender can markedly influence cultural practices, preferences and prior experiences.

This best evidence synthesis is intended to contribute to evidence-based and comprehensive strategies for optimising learning opportunities for Māori and breaking patterns of system under-performance for Māori. Accordingly, it is fundamental to the approach taken to diversity in New Zealand education that it honours Articles 2 and 3 of the Treaty of Waitangi. Through a focus on what works for Māori in every schooling context, this synthesis and other best evidence work has been designed to contribute to developing system capability to support Māori students to live as Māori and to actively participate as citizens of the world.

While the fundamental issue for quality teaching is the heterogeneity of the particular group of learners with any teacher, demographic patterns highlight the importance of the issue of ethnic diversity for New Zealand education. The ethnic mix of our students is changing markedly. European Pakeha have been a majority in New Zealand schooling for more than a century but this pattern is changing. In 1994 over one quarter of the students in New Zealand schooling were Māori (20.3) and Pasifika (6.8%). Pasifika students comprised 8% of students in 2001. The proportion of international and Asian students in our schools has grown from 4% to almost twice that proportion over the past decade. By 2040, current projections predict that the majority of students in New Zealand primary schools will be Māori and Pasifika. This change will occur within the working life of teachers who are currently being trained or inducted into teaching.

There is also marked heterogeneity within broad ethnic group descriptors, for example, Pakeha European, Asian, Māori and Pasifika. While diversity within Māoridom has been evident in consideration of the needs of children of urban and rural Māori there have been repeated calls from Māori to attend to diversity. For example, Pere (1988)³⁷ challenged educators to acknowledge the diversity within Māori iwi:

35 Biddulph, F., Biddulph, J., & Biddulph C. (2003). *The complexity of community and family influences on children's achievement in New Zealand: Best evidence synthesis*. Report prepared for the Ministry of Education. Wellington: Ministry of Education.

36 Ballard, P.B. (1915). Norms of performance in the fundamental processes of arithmetic, with suggestions for their improvement. *Journal of Experimental Pedagogy*, 3, 9-20.

37 Pere, R. (1988). Te Wheke: Whaia te maramatanga me te aroha. In S. Middleton (Ed.). *Women and Education in Aotearoa*. Wellington: Allen & Unwin Ltd.

Much has been said about the Māori people since the early Māori-Pakeha contact period...So much of it has endeavoured to categorise and fit the Māori people into 'closed' models with definite boundaries; models that do not have the structure or the capacity to deal with the diversity that exists within proud tribal cultures'. (p. 13)

Pasifika students include students whose heritages are Samoan, Cook Island Māori, Tongan, Niuean, Tokelauan and Tuvalu Islander, and within group diversity by gender, recency of immigration and other characteristics creates wide diversity under the 'Pasifika umbrella'. The term 'Asian' encompasses a particularly diverse group of New Zealand and international students by nationality of origin, language, ethnicity, heritage, culture and recency of immigration or arrival.

Our student population is growing increasingly and rapidly more heterogeneous. Many of the ethnic groups in New Zealand are diverse by language, heritage and recency of immigration. Many of our students have multiple ethnic heritages.

As is apparent in the patterned spread of national achievement results on international tests and in the National Monitoring outcomes, the New Zealand schooling system has been performing, on average, less well for Māori and Pasifika students. Our track record to date raises questions about teaching quality for many students. For example, research over at least two decades has revealed that mainstream teachers in New Zealand hold inappropriately low expectations for, make inappropriate assessments of, and/or provide lower levels of praise for, Māori students in English medium New Zealand classrooms (Benton, 1986³⁸; Carkeek, Davies & Irwin, 1994³⁹; Clay, 1985⁴⁰; Millward, Neal, Kofoed, Parr, Kuin Lai & Robinson, 2001⁴¹; St George, 1983⁴²; Thomas, 1984⁴³). Cazden (1990)⁴⁴ carried out an in-service intervention with New Zealand junior class teachers designed to counter the pattern of differential treatment of Māori in classroom lessons, but found the pattern resistant to effective intervention. When ERO (1995)⁴⁵ analysed policy documents from 272 schools identifying barriers to learning, they found that schools predominantly characterised underachieving students and their families as barriers to learning – suggesting that deficit thinking about student failure is common amongst New Zealand teachers and schools (see also Biddulph, Biddulph & Biddulph, 2003)⁴⁶.

Recent research provides evidence that effective and responsive teaching can enable high standards for Māori and Pasifika six-year olds in low decile schools, and that a classroom-based, research-informed, professional development programme can enable quality teaching for these children (Phillips, McNaughton & McDonald, 2001)⁴⁷. This synthesis draws on such research to show how quality teaching can optimise outcomes for diverse learners across the curriculum, and throughout schooling.

As is evident throughout this synthesis, what works to improve the achievement of advantaged students is what works for disadvantaged or 'at-risk' students. This pattern of evidence was influential in the preparation of the US Educational Research Service's *Handbook of Research on Improving*

38 Benton, R. (1986). Now fades the glimmering: Research in classrooms in New Zealand. *SET Research Information for Teachers*, 2(12).

39 Carkeek, L., Davies, L., & Irwin, K. (1994). *What happens to Māori girls at school? Final Report*. Wellington: Ministry of Education.

40 Clay, M. (1985). Engaging with the school system; A study of interactions in New Zealand classrooms. *New Zealand Journal of Educational Studies*, 20(1), 20-38.

41 Millward, P., Neal, R., Kofoed, W., Parr, J., Kuin Lai, M., & Robinson, V. (2001). Schools learning journeys: Evaluating a literacy intervention at Dawson Road Primary School. *SET Research Information for Teachers*, 2, p. 39-42.

42 St. George, A. (1983). Teacher expectations and perceptions of Polynesian and Pakeha pupils and the relation of classroom behaviour and school achievement. *British Journal of Educational Psychology*, 53, 48-59.

43 Thomas, D. (1984). (Ed.). *Patterns of social behaviour: New Zealand and the South Pacific. (Psychology Research Series, No. 17)*. Hamilton: University of Waikato.

44 Cazden, C. (1990). Differential treatment in New Zealand: Reflections on research in minority education. *Teaching and Teacher Education*, 6(4), 291-303.

45 Education Review Office (1995). *Barriers to learning. National Evaluation Reports (No. 9)*. Wellington: Education Review Office.

46 Biddulph, F., Biddulph, J., & Biddulph, C. (2003). *The complexity of community and family influences on children's achievement in New Zealand: Best evidence synthesis*. Report prepared for the Ministry of Education. Wellington: Ministry of Education.

47 Phillips, G., McNaughton, S., & MacDonald, S. (2001). *Picking up the pace: Effective literacy interventions for accelerated progress over the transition into decile 1 schools*. Final report to the Ministry of Education. Auckland: The Child Literacy Foundation and the Woolf Fisher Research Centre.

Student Achievement (Cawelti, 1999)⁴⁸. Accordingly, a key message of the synthesis is the importance of high quality teaching in optimising outcomes for diverse students.

As apparent in the title of the synthesis this notion of 'heterogeneity' or 'diversity' is central to the synthesis. This frame rejects the notion of a 'normal' group and 'other' or minority groups of children and constitutes diversity and difference as central to the classroom endeavour and central to the focus of quality teaching in Aotearoa, New Zealand.

4. Student Outcomes

Educational achievement is seen to be an outcome at all levels of schooling, but particularly at the school leaving stage. The term 'achievement' encompasses achievement in the essential learning areas⁴⁹, the essential skills⁵⁰, including social and co-operative skills, the commonly held values including the development of respect for others, tolerance (*rangimārie*), non-racist behaviour, fairness, caring or compassion (*aroha*), diligence and hospitality or generosity (*manaakitanga*). Educational outcomes include attitudes to learning, and behaviours and other outcomes demonstrating the shared values. Educational outcomes include cultural identity, well being, whanau spirit and preparation for democratic and global citizenship. Desired outcomes reflect the New Zealand Curriculum Framework and the philosophy of Kura Kaupapa Māori. Along with an accompanying synthesis⁵¹, this work includes where possible, evidence relating to the outcome goals for Māori students advanced by Mason Durie (2001)⁵² at the Hui Taumata Mātauranga. These are listed below.

Goal 1: to live as Māori.

Goal 2: to actively participate as citizens of the world.

Goal 3: to enjoy good health and a high standard of living.

48 Cawelti, G. (1999) (2nd edition). *Handbook of research on improving student achievement*. Arlington, VA: Educational Research Service. (This is the handbook selected for use by UNESCO).

49 *Language and languages, mathematics, science, technology, social science, arts, and health and physical well-being*. In Ministry of Education. (1993). *The New Zealand Curriculum Framework*. Wellington: Ministry of Education.

50 *Communication skills, numeracy skills, information skills, problem-solving skills, self management and competitive skills, social and co-operative skills, physical skills and work and study skills*. In Ministry of Education. (1993). *The New Zealand Curriculum Framework*. Wellington: Ministry of Education. (p. 17).

51 Biddulph, F., Biddulph, J., & Biddulph, C. (2003). *The complexity of community and family influences on children's achievement in New Zealand: Best evidence synthesis*. Report prepared for the Ministry of Education. Wellington: Ministry of Education.

52 Durie, M. (2001, February). *Hui Taumata Mātauranga : A framework for considering Māori educational advancement*. Opening address to the Hui Taumata Mātauranga. Turangi/Taupo.

5. The Challenge of Indicators of Quality Teaching

... yet you can work for ages and write out stuff
and all this kind of stuff without learning

*Jim, aged 11*⁵³

Student Outcomes as Quality Teaching Indicators

Quality teaching cannot be defined without reference to outcomes for students. Even if on the surface the quality of teaching appears to be high, when it is not assisting students to learn, the teaching has failed⁵⁴.

Barriers to Evaluating the Quality of Teaching Through Observation

There are multiple barriers to judging the quality of teaching, even through direct observation. For example:

- Because the student learning process occurs in students' minds, direct evidence of teaching quality or effectiveness is essentially unobservable. Judgements are necessarily based on inferences.
- Because pedagogy is a creative endeavour in a complex environment⁵⁵, the range of effective pedagogical approaches used by teachers can be infinitely diverse. Accordingly, it is difficult to make valid or reliable judgements based on particular pedagogical models.
- Because teachers work with classes rather than individuals it is difficult to judge the extent to which teaching is effective for all students.
- Teaching quality varies for the same teacher teaching in different curriculum areas. Because the factors influencing quality can be curriculum-specific, the same teacher can, for instance, be teaching effectively in language but less effectively in mathematics.
- Quality teaching is responsive to the developmental level of the students taught.
- The characteristics of quality teaching are like an iceberg. Much of what is done by the teacher to skilfully create effective tasks, a learning community, effective routines, and opportunities for student learning is invisible, and has been built up with students over a period of time but underpins effective practice.
- Quality teaching is a co-construction with students. While the teacher has considerable influence over the learning environment, on any particular day, unpredictable extraneous influences over which a teacher has no control can derail the practice of a teacher whose teaching is customarily outstanding.
- The presence of an evaluating observer influences the dynamic of what is happening in the classroom. This influence can lead to observation of behaviours and interactions that are not customarily characteristic of the teaching-learning situation for a class.

Accordingly, the most valid indicators of quality teaching are student outcomes of a high standard across heterogeneous groups of students. Given the acknowledged constraints on observational judgements, positive changes in student achievement (including social outcomes), appropriately assessed, will continue to provide our best indicators that quality teaching has occurred.

Notwithstanding the difficulties inherent in judging quality teaching, it is still essential to continue to develop our knowledge. Quality teaching is such a strong influence on variations in student

53 Alton-Lee, A., & Nuthall, G. (1998). *Inclusive instructional design: Theoretical principles emerging from the Understanding Learning and Teaching Project*. Report to the Ministry of Education. Wellington: Ministry of Education.

54 See Nuthall's finding discussed in full subsequently.

55 Doyle, W. (1986). Classroom organisation and management. In M. Wittrock (Ed.), *Handbook of Research on Teaching*. (Third Edition). New York: MacMillan Publishing Company. Doyle notes that the nature of the classroom environment is characterised by multidimensionality, simultaneity, immediacy, unpredictability, publicness and history. (p.395).

achievement that it is critical that we further our knowledge of the characteristics of quality teaching so that we can assist in developing teaching capability.

Effective Pedagogy: A Policy Vacuum?

There is a challenge to policy makers in bringing together the research evidence about effective teaching. The research literature on quality teaching has been found to be difficult to access by contributors to the review sought for the Ministry of Education's Strategic Research Initiative. That review was commissioned to focus on links between pedagogy and achievement and drew on a small window of five years of recent research (Carr, McGee, Jones, McKinley, Bell, Barr & Simpson, 2000)⁵⁶. The authors concluded that while the teacher plays a crucial role in student achievement, teaching is a complex activity and 'the literature on pedagogy suggests that this is a difficult area to research because of the complexity of classroom interactions' (p. 109). Luke, Matters, Herschell, Grace, Barrett, and Land, R. (2000)⁵⁷ identify a '*policy vacuum*' around pedagogy in comparison with assessment and curriculum. They point out that many reforms have failed because they '*are silent about pedagogy*' (p.37). This best evidence synthesis explicitly seeks to help address that silence through this initial focus on evidence-based generic characteristics of quality teaching for schooling. A focus on generic characteristics can make an important contribution to developing our knowledge but is insufficient in itself. This synthesis is offered as a step on the way to developing rich syntheses informed by local as well as international research that bring together, and provide a stimulus for further developing our evidence bases for pedagogies specific to the different curricula areas.

Understanding the Importance of Context

Evident in a range of recent syntheses on research on effective teaching has been the increased understanding that context is important. Context is a key to understanding the complexity of classroom practice, for example, curriculum context, age of students, cultural and socio-economic backgrounds of the students, student mix, the pedagogical and subject-matter knowledge of teachers, and the contexts generated by teachers through their design and sequencing of tasks. Accordingly, research in the New Zealand context has particular potential to illuminate our understanding of quality teaching.

Quality Teaching for Diverse Students in New Zealand Schooling - The Need for Systematic Access to New Zealand Research on Teaching and Learning

There have been few reviews of New Zealand research on learning and teaching. The absence of such reviews gives weight to the need for knowledge management systems to be developed that will give easy and systematic access to New Zealand research about pedagogical processes linked to student outcomes. This will also enable systematic and cumulative development of research knowledge from New Zealand classroom research, particularly that done in theses and reports held in universities, and those carried out in the course of action research studies or Masters research papers by New Zealand educators. Currently there is no single electronic list even of the titles and authors of New Zealand education theses. It is beyond the scope of any one synthesis to bring such knowledges together and there is a need to develop supporting syntheses for different curriculum areas. Such work could challenge, broaden, improve and systematically update this synthesis of generic characteristics, particularly in the light of ongoing evidence about trends in student outcomes from national monitoring evidence. Because of the importance of context in influencing what works, and the need for knowledge about the diversity of students in New Zealand schooling, we need to grow systematic and rigorous syntheses of best evidence that are most readily relevant and applicable for the diverse students in New Zealand schooling.

56 Carr, M., McGee, C., Jones, A., McKinley, E., Bell, B., Barr, H., & Simpson, T. (2000). *The effects of curricula and assessment on pedagogical approaches and educational outcomes*. Wellington: Ministry of Education.

57 Luke, A. Matters, G., Herschell, P., Grace, N., Barrett, R., & Land, R. (2000). *New Basics Project: Technical paper*. Queensland: Education Queensland.

Curriculum Context: Is Quality Teaching the Same for Literacy and Mathematics?

The answer to this question is 'no'. While there are evidence-based principles about quality teaching, these principles are enacted in ways specific to particular curricula areas or kinds of learning outcome.

The research is clear that both the subject matter knowledge and pedagogical knowledge of teachers are critical to their effectiveness⁵⁸. This finding is emphasised in a review of future-focused research on learning and teaching prepared for the Ministry of Education by a research team from Massey University⁵⁹:

A fundamental tenet of contemporary learning theory is that different kinds of learning outcomes require different approaches to teaching. Although much of what people learn occurs without formal instruction, adults have a key role in helping novice learners make the connections between new situations and familiar experiences. This means that effective teachers require pedagogical content knowledge - knowledge about how to teach in different disciplines - which is quite different from knowledge of general teaching methods (Bransford, Brown & Cocking, 1999). The research has shown that there is a dynamic interaction between teachers' knowledge of the discipline and their knowledge of pedagogy. This contradicts an historical misconception that teaching consists only of a set of general teaching methods; that is, effective teachers can teach any subject, and that content knowledge alone is adequate. The lesson from the research is that teachers' professional knowledge is anchored in, and indexed by, context. (p.224)

Managing the Tension Between Curriculum-Specific Pedagogy and Generic Characteristics of Quality Teaching

Generic characteristics of quality teaching often need contextual elaboration in terms of curriculum-specific pedagogy to be useful in practice. To assist in the management of this tension the framework for the chapter was initially structured using Brophy's (2001)^{60 61} generic guidelines for good teaching derived from a synthesis of evidence from international classroom research across the curriculum. Brophy's approach was to make the tension transparent. He invited 14 leaders in classroom research in different disciplinary fields who were also teacher educators to produce a review of research for their curriculum areas, then to critique generic guidelines in the light of their curriculum-specific findings.

Brophy (2001) provided an outline of the approach taken in deriving the principles of good teaching from studies of relationships between classroom processes and student outcomes, the logic of instructional design and emergent theories of teaching and learning (particularly socio-cultural). He gives priority to principles shown to be applicable under ordinary classroom conditions and associated with progress towards desired student outcomes.

For this Ministry of Education best evidence synthesis, the use of international research has been selective. The approach has favoured claims derived from research evidence rigorously linked to student outcomes, but with some explicit exceptions where there has been evidence carefully linked to quality learning processes.

58 The Ministry of Education's 2001 draft initial best evidence synthesis for professional development which is being developed through a forthcoming iteration.

59 Codd, J., Brown, M., Clark, J., McPherson, J., O'Neill, H., O'Neill, J., Waitere-Ang, H., & Zepke, N. (2001 draft). *Review of future-focussed research on teaching and learning*. Report to the Teaching and Learning Theme Team for the Strategic Information Overview Group, Ministry of Education. Wellington: Ministry of Education.

60 Brophy, J. (2001). (Ed). Subject-specific instructional methods and activities. *Advances in Research on Teaching*. Vol. 8. New York: Elsevier.

61 Brophy's synthesis has been sponsored by the International Academy of Education, and critiqued by the Invisible College of Research on Teaching. He has been honoured by the largest international educational research association, the American Educational Research Association, for his leading contribution to classroom research and was the co-author with Tom Good of key syntheses of research on effective teaching and schools in the third edition of the American Educational Research Association's *Handbook of Research on Teaching*.

6. Best Evidence Synthesis Approach

Best Evidence Synthesis: A Systematic Review of Evidence

The best evidence synthesis approach is a systematic review strategy. The approach is intended to provide a rigorous, transparent, and concise evidence-base for informing policy and practice. The approach is similar to evolving approaches used elsewhere for systematic reviews (Nutley, Davies & Walter, 2002⁶²; Oakley, 2002⁶³; Pawson, 2001⁶⁴; and Slavin, 2002⁶⁵). However, the methodology has been developed specifically to illuminate quality teaching.

The Importance of Evidence Linked to Outcomes

This best evidence synthesis focuses on evidence from research about pedagogical practices that optimise student learning, and achievement outcomes (including social outcomes). This approach has required a selective approach to the research literature because there is much research about teaching that does not include evidence about the impact on students, but takes an ideological perspective on what is desirable.

What counts as best evidence is classroom-based research that has demonstrated a systematic relationship between pedagogical practice and student achievement outcomes. Generally, research is only included in this synthesis if such a link has been demonstrated. Of particular importance is research that demonstrates a link to students' long-term learning. Learning that is forgotten can mislead the teacher. There is evidence that students who have not had particular experiences of the wider world can appear to have learned something as judged by assessments immediately after instruction, but because the new information is not linked to relevant prior experience, the new understandings are quickly lost from memory. Such superficial learning is not available to the student to build further knowledge and skills, and accordingly may not be a good indicator of quality teaching.

Where there is consistent evidence that a widely used teaching approach has not produced higher outcomes for diverse students or, in particular, has had negative impacts on diverse students' opportunities and outcomes then such evidence is also included.

Research that provides strong evidence of quality teaching processes is also included. For example, Hohepa, Hingaroa Smith, Tuhiwai Smith and McNaughton's (1992)⁶⁶ study is included because it provides very high quality observational data showing links between learning processes, student and teacher and student-student interactions, and the ways in which these are shaped by cultural context. This research which is set in an early childhood context exemplifies processes relevant for junior school classes and provides an important linking study for the best evidence synthesis of quality teaching in early childhood settings⁶⁷ commissioned by the Ministry of Education. Also, where international research syntheses such as Brophy's show particular pedagogical practices to be linked to student outcomes (e.g. reinforcement), then New Zealand classroom research that illustrates such processes in our own context is included.

This synthesis excludes reports that have selectively exemplified classroom practices or used anecdotes to support particular views of what is desirable in teaching without there being clear or pedagogically credible evidence of links to student learning processes.

62 Nutley, S., Davies, H., & Walter, I. (2002). *Evidence based policy: Cross-sector lessons from the UK*. Keynote paper for the Social Policy Research and Evaluation Conference, Wellington, NZ (conference postponed to 2003). University of St. Andrews, Scotland.

63 Oakley, A. (2002). Social science and evidence-based everything: The case of education. *Educational Review*, 45(3), 277-286.

64 Pawson, R. (2001). *Evidence-based policy: The promise of 'realist synthesis'*. (Working Paper 4), London: ESRC, UK Centre for Evidence Based Policy and Practice, Queen Mary, University of London.

65 Slavin, R.E. (2002). Evidence-based education policies: Transforming educational practice and research. 2002 Dewitt Wallace-Reader's Digest Distinguished Lecture. *Educational Researcher*, 31(7), 15-21.

66 Hohepa, M., Hingaroa Smith, G., Tuhiwai Smith, L., & McNaughton, S. (1992). Te Kohanga Reo hei Tikanga ako I te Reo Māori: Te Kohanga Reo as a context for language learning. *Educational Psychology*, 12 (3 & 4): 333-346.

67 Farquhar, S. (2003). *Quality Teaching - Early Foundations: Best evidence synthesis*. Report prepared for the Ministry of Education. Wellington: Ministry of Education.

The best evidence approach also excludes or raises questions about case studies that are not linked to student outcome data or evidence of quality learning processes for students. In some cases these may have very little to add to our knowledge (because they can simply carry the assumptions of the teacher/ researchers laid over accounts of practice rather than the evidence of influences on student learning).

Particular weight has been given in this synthesis to outcomes-linked evidence reported by authors of chapters in the leading and peer-reviewed international handbooks, for example, V. Richardson (Ed.). *Handbook of Research on Teaching* (Fourth Edition). Washington D.C: American Educational Research Association, and G. Cawelti (Ed.). *Handbook of Research on Improving Student Achievement* (Second Edition). Virginia: Educational Research Service. Also weight has been given to international research reported in peer reviewed journals. Brophy's work has been given particular weight because of his leading role in classroom research. Professor Brophy co-authored the chapter on 'Teacher behaviour and student achievement' in the third edition of the *Handbook of Research on Teaching*⁶⁸, has been honoured as a leading educational researcher by the American Educational Research Association and founded the recent series 'Advances in Research on Teaching'⁶⁹. As discussed elsewhere he has also provided an updated cross-curricular review of research on teaching in 2001⁷⁰.

The Importance of New Zealand Evidence

New Zealand evidence is critical for this synthesis because it tells about what we know about what does and doesn't work for our students. The synthesis draws upon the best available international evidence from classroom and other relevant research, but has qualified the applicability of that research through, wherever possible, drawing upon New Zealand evidence about links between teaching and the learning of our diverse students.

Where there is a finding from international syntheses of research that is linked to achievement, and where there is classroom-based research that shows a pattern of student experience of teaching that exemplifies the principle at work in a New Zealand context, then such work is included. Where an evaluation or national monitoring outcomes demonstrate a lift in student achievement in New Zealand, information about policy-linked pedagogical strategies that appear to be influencing such a lift is included.

The role of the Ministry of Education's Curriculum, Teaching and Learning Division has been particularly significant in this iteration in providing evidence that has been generated out of, or evaluated in relation to, the New Zealand schooling context. In particular, the research-based knowledges arising out of the literacy and numeracy initiative and the assessment strategy and evaluations have provided strong evidence of influences on New Zealand student outcomes. As discussed elsewhere in this synthesis, there is much New Zealand research that is not easily accessible, and this is an area for future development.

Using Quantitative Research, Meta-analyses and Case Studies

It is important to consider the complementary and critical role that meta-analyses and case studies play in illuminating our knowledge of quality teaching, as long as each is carefully linked to student outcomes. Meta-analyses can identify variables that show a strong positive association with student outcomes and can give important information about the comparative magnitude of impact of different characteristics. At the same time, an important consideration is that findings of lower magnitude or contradictory and varied findings (for example, homework) may represent variation amongst educators in their effectiveness with diverse students. Accordingly, variable findings may provide particular insight into the kinds of teaching practices that need to be improved.

68 Wittrock, M. (Ed.). (1986). *Handbook of Research on Teaching* (Third Edition). A Project of the American Educational Research Association. New York: McMillan

69 Published by JAI Press and Elsevier.

70 Brophy, J. (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching*. Vol. 8. New York: Elsevier.

The results of meta-analyses provide the pointers to the kinds of teaching-learning activities that characterise quality teaching and give us a sense of the weight of evidence but they can only offer an overview framework. It is with the rich detail of case studies that the complexity of the learning processes and impact of effective pedagogy can be traced in context, in ways that teachers can understand implications for their practice. Accordingly rigorous case studies that trace the influence of teaching using pre and post -assessments of student learning play a key role in generating knowledge about quality teaching. The cumulative power of the synthesis of many rigorous case studies embedded within the overview framework provided by meta-analytic findings provides our best evidence about quality teaching for diverse learners.

Findings from action research studies carried out by teachers that provide evidence of changes for students linked to characteristics of the teaching approaches are also included. Data collection may not have always been systematic in these studies because of the teacher's primary focus on their teaching rather than researcher role. Nonetheless carefully reported evidence of student change from teacher studies can help build up our understanding of influences on student learning in the New Zealand context, especially when these findings are triangulated with evidence-based findings in the international research.

The 'Jigsaw Puzzle' Approach

We have used the metaphor of a 'jig saw puzzle' to describe the best evidence synthesis methodology because pieces of the puzzle about the links to student outcomes are often spread over and embedded within a range of classroom research studies. Accordingly, the search, and the analytic and synthesising approaches are iterative across classroom research studies rather than carried out and reported study by study as can be the case in traditional literature reviews.

The 'jigsaw puzzle' approach also calls for attention to apparently conflicting evidence. Such conflicts can provide clues about the importance of differences in context to quality teaching and help illuminate and deepen our understanding of quality teaching, for example in the case of the teacher expectations literature.

What does become apparent in the course of this 'jigsaw puzzle' approach is that when the 'bits of evidence' are brought together some strong patterns emerge from the research literature, for example, the key role of metacognitive strategies.

An important element of the 'jigsaw puzzle' approach is the analytic work carried out to help interpret the implications of the evidence for heterogeneous groups of students, for Māori and Pasifika, and for the particular students in New Zealand classrooms.

Transparency

Because the evidence is frequently curriculum-specific, curricular context is made explicit where possible. Where the evidence may be specific to older or younger learners this contextual information is made explicit. Where the synthesis draws upon research that does not show such strong links to outcomes then an attempt has been made to make the status of the research apparent.

The use of footnoted references is another device used to make the links between the claims in the synthesis and the evidence transparent. It is intended that such transparency will help readers to engage with the nature of the evidence base, and to understand the strengths and weaknesses of the evidence base. The purpose of this transparency is twofold. First, the transparency is intended to assist policy makers to interpret the weight of the evidence. Second, the transparency is intended to assist critique and development of this work and related best evidence syntheses specific to curriculum areas, through future iterations.

Iterative Methodological Development

The process of developing a methodology to provide a synthesis that is both rigorous and useful is in itself an iterative process. As the range of best evidence syntheses proceed informed by the processes of critique and feedback, increasing systematic knowledge management capability and formative

quality assurance, we aim to develop collaboratively a best evidence synthesis toolkit or protocol that can optimise the value of this approach.

Magnitude of Effect: What Makes the Most Difference for Diverse Students?

Meta-analyses report the magnitude of results by effect size. An effect size is the standardised difference between the mean achievement of the intervention group and the mean achievement of a group that did not receive the intervention. Generally in the research literature this other group will have had 'traditional' or business-as-usual teaching. There are differences of opinion in the research literature about what counts as a substantial effect size. Hattie (1999)⁷¹ argues for a threshold of .40 in educational research as an indication of a teaching approach that makes a substantial difference to student achievement over and above business-as-usual. Hattie points out that an effect size of 1.0 for an intervention or approach represents the equivalent of about one year of achievement gain for business-as-usual teaching. In their landmark overview of meta-analytic results in psychological, educational and behavioural fields Lipsey and Wilson (1993)⁷² point out that in life-and-death situations in medicine small effect size differences - even 0.07 have important practical significance. In education, interpreting effect size is also complex because the different characteristics we are investigating are often complementary and overlapping rather than competing parts of the teaching process. Also effect sizes may differ markedly because what constitutes an intervention can vary so much in practice. All teaching practice is unique for any particular group of learners and some approaches such as co-operative learning vary from very structured, quite closely replicable teaching approaches, to informal practices that may even counter evidence-based principles.

Inter-relatedness of the Ten Characteristics

Despite the invaluable information about magnitude and consistency of influence, the findings about particular variables on their own, taken out of context, are not very helpful in guiding quality teaching because of the curvilinear nature of the relationships and the complexity of teaching. When too little or too much of a teacher behaviour or learning opportunity occurs learning can be impeded. As discussed in the introduction to the report, while teacher feedback, wait-time, and many other variables do show strong positive relationships to student learning, there are dangers in extrapolating from these findings to indicators that guide practice. If teachers increase the amount of any of these behaviours with a view to improving teaching, while not paying attention to students' learning processes, then such indicators could become counterproductive. Most variables for which there are positive relationships to learning are positive because the behaviour occurs sufficiently, appropriately and responsively to enable learning. A certain amount of teacher feedback that is appropriately responsive to students shows a positive relationship but too much of this behaviour can undermine learning.

Each behaviour identified as being positively related to learning on average, needs to be understood and used within the context of the cluster and sequencing of effective teacher behaviours and responsiveness to students. Early micro-teaching studies did not lead to clear positive outcomes in teaching (Cruikshank & Metcalf, 1990)⁷³. One explanation is that when teachers were initially trained to use behaviours that had been specifically identified as having a positive relation to learning, they became more focused on the behaviours and less focussed on the learners and the quality of their teaching deteriorated rather than improved.

Accordingly, all ten characteristics are presented as a set of inter-related findings about what works, with the effect size information helping to identify particularly powerful pedagogical strategies, and illuminating teaching practices where there is marked variation in effective use. Because the ten characteristics are inextricably inter-related there are overlaps. While every attempt has been made to streamline the discussion, overlaps help make transparent the linkages.

71 Hattie, J. (April, 1999). *Influences on student learning*. Inaugural lecture, University of Auckland, New Zealand

72 Lipsey, M.W., & Wilson, D. (1993). The efficacy of psychological, educational, and behavioral treatment: Confirmation from meta-analysis. *American Psychologist*, 48 (12), 1181-1209.

73 Cruikshank, D.R., & Metcalf, K.K. (1990). Training within teacher preparation. In W. R. Houston (Ed.). *Handbook of Research on Teacher Education. A project of the Association of Teacher Educators*. New York: Macmillan.

The Best Evidence Synthesis Series

While this synthesis focuses on quality teaching, there is a need for complementary syntheses focused on our best evidence about other direct and mediating influences on outcomes, (for example, families and communities, educators, resources, institutional organisation, management, leadership and governance). To date two companion syntheses have been completed focused on quality teaching in early childhood⁷⁴ and the complex influences of families and communities on educational outcomes⁷⁵.

Quality Assurance

Throughout the process of developing this synthesis there has been an iterative process of feedback and development within the Ministry of Education.

Professor Brophy read the draft version of the synthesis and affirmed that it made appropriate use of his own work. He also emphasised the importance of addressing diversity without contributing to unintended stereotyping effects. Dr Gordon Cawelti⁷⁶, Consultant for the Educational Research Service in the United States and Professor Stuart McNaughton of the University of Auckland provided valuable formative quality assurance for this iteration of the synthesis and advice about future developments. As a result of the formative quality assurance the following revisions have occurred: the initial set of 12 characteristics has been streamlined to 10, key international studies and meta-analyses not originally located have been included, the inclusion of research across the curriculum has been more comprehensive, and gaps have been addressed. Also assistance has been provided within the Ministry of Education to provide more extensive consideration of students with special needs.

Dr Cawelti sought more attention to the research on student motivation and aspiration, and this literature has been integrated across the characteristics, but the evidence base on student aspirations is challenging and more could be done to illuminate this important area in subsequent iterations. Dr Cawelti also asked that more attention be given to professional development issues and these are being explicitly addressed in a companion synthesis in progress. Both formative reviewers were uneasy about the use of the 'scaffolding' metaphor (but not the strong evidence base per se). Their concerns and those of others about the metaphor 'scaffolding' have been considered and discussed to help develop our knowledge about, and precision in using this evidence. Professor McNaughton was concerned that the revision might compromise conciseness and ready access of the sector to the work and his concerns have influenced the approach to revision and the format.

The formative quality assurance has been a critical element in this project to develop strategic information for policy through the use of a systematic and transparent review and synthesis protocol. The input of the formative reviewers has been invaluable also in advising the Ministry of Education about strategies for working with educators to produce accessible forms of the evidence.

Using this Synthesis

The format of this synthesis has been designed to ensure that the evidence-base is transparent and to stimulate further iterative development of our evidence-base about quality teaching. The format is designed to encourage New Zealand classroom researchers to make transparent the way their work builds on, challenges and develops our knowledge base about what works for our diverse learners in New Zealand schooling. However, this best evidence synthesis is primarily intended to provide a source document to develop user-friendly and accessible versions of the information in consultation with, and for, teachers and policy makers.

74 Farquhar, S. (2003). *Quality Teaching - Early Foundations: Best evidence synthesis*. Report prepared for the Ministry of Education. Wellington: Ministry of Education.

75 Biddulph, F., Biddulph, J., & Biddulph, C. (2003). *The complexity of community and family influences on children's achievement in New Zealand: Best evidence synthesis*. Report prepared for the Ministry of Education. Wellington: Ministry of Education.

76 Dr Cawelti was Executive Director of the U.S. Association for Supervision and Curriculum Development from 1973-1992. He has been actively involved in a series of national studies of school innovation and is the editor of the following handbook used by UNESCO: Cawelti, G. (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

7. Characteristics of Quality Teaching

(I) Quality Teaching is focused on Raising Student Achievement (including Social Outcomes), and Facilitates High Standards of Student Outcomes for Diverse Learners

Research-based characteristics

- Quality teaching is focussed on raising student achievement (including social outcomes).
- Quality teaching facilitates the learning of diverse students and raises achievement for all learners.
- The teacher establishes and follows through on appropriate expectations for learning outcomes and the pace at which learning should proceed.
- High expectations are necessary but not sufficient, and can be counterproductive, when not supported by quality teaching.

Teaching is focussed on raising student achievement (including social outcomes)

While a focus on raising student achievement may seem a given in quality teaching, the complexity of educational practice, and competing demands from many sources, can obscure the goal of student achievement. The Second Evaluation Report⁷⁷ of the Strengthening Education in Mangere and Otara initiative emphasises this point in the local and the policy context:

One of the themes that emerges from the chapters of this report is the way tasks other than sustained improvement in student achievement can wittingly or unwittingly replace and subvert the attention and effort that is needed to achieve this goal.

If the Ministry of Education communicates either through its words or deeds that the task is to fill empty schools, to win community confidence, to improve relationships, to increase parent participation or to empower local groups, it risks doing so in ways that do not also improve student achievement. (p. 134)

Further, achievement expectations can become narrowly defined in practice to academic outcomes, rather than explicitly including the range of academic, social, skill, attitudinal, well-being and other outcomes, as outlined in the national curriculum and sought by the wider society. The evidence for the interdependence of academic and social outcomes is reported later in the synthesis.

The development of classroom learning communities has been an approach that enables a proactive and sustained focus on learning (with integral attention to the social dimensions of learning) by both teachers and students. This approach is consistent with all ten characteristics but is considered specifically in the second characteristic of quality teaching.

Quality teaching facilitates the learning of diverse students and raises achievement for all learners

The research reviewed throughout this synthesis shows that high gains are possible for low achievers, high achievers, students of different socio-economic backgrounds and ethnic heritages, and students with special needs within the same class grouping. This principle is taken as definitional of quality teaching. Quality teaching is not effective for just some learners but is effective for all learners.

Even when teachers are focussed on student learning, inappropriate teacher expectations can undermine students, or constitute a barrier to effective practice. Teacher expectations have been found to vary by student ethnicity, dis/ability, gender and other student characteristics unrelated to a student's actual capability.

⁷⁷ Robinson, V., Timperley, H., & Bullard, T. (2000). *Strengthening Education in Mangere and Otara: Second Evaluation Report*. Report to the Ministry of Education. Auckland: Auckland Uniservices Ltd.

U.S. research shows a pattern of teachers overestimating the achievement of high achievers, underestimating the achievement of low achievers and predicting least accurately the responses of low achievers (Gottfredson, Birdseye, Gottfredson & Marciniak, 1995)⁷⁸. There is a longstanding pattern of evidence showing that mainstream teachers in New Zealand hold inappropriately low expectations for, and make inappropriate assessments of, the achievement or capability of Māori students (Benton, 1986⁷⁹; Clay, 1985⁸⁰; Millward, Neal, Kofoed, Parr, Kuin Lai & Robinson, 2001⁸¹; St George, 1983⁸²; Thomas, 1984⁸³). There is also New Zealand evidence of inappropriately low expectations held by the teachers of students with Down Syndrome (Rietveld, 1994⁸⁴; 1999⁸⁵). In his early review of two decades of research on teacher expectations, Good (1987)⁸⁶ concluded that the critical issue around teacher expectations is training teachers to expect to be able to teach students effectively regardless of their current performance.

There is evidence that differential expectations for, and treatment of, Māori and Pasifika students (that are inhibiting the learning of students) continue under the guise of a 'learning styles' approach. Despite the intent to achieve better outcomes for diverse students, there is increasing New Zealand and international evidence of negative outcomes for some students when teachers use learning styles approaches. An authoritative review by Irvine and York (1995)⁸⁷ of evidence about 30 instruments to measure learning styles, evaluated the Learning Styles Inventory (which has been a foundation for learning styles instruments and approaches used in New Zealand). The term 'learning style' is most frequently used to mean the learner's preference for an auditory, visual, tactile or other source and/or expression of, information. The evaluation concluded that, despite the popularity of the instrument, 'the design strategy, reliability and validity of the inventory were largely unsupported by the research evidence' (p.487).

A recent review of research evidence (Riding & Rayner, 1998)⁸⁸ is also critical, citing Sternberg's⁸⁹ view, amongst others, that the approach 'ignores the learning process in favour of a focus on environmental elements affecting the learner's ability to learn' (p.69). This is of concern, given the strength of research findings across the curriculum areas that a student's learning process and engagement with curriculum should be the focus of responsive teaching. In his consideration of the evidence about learning styles, McMillan (2001)⁹⁰ highlights several concerns including: the costs and limitations of the learning styles assessment approach, the failure to focus on the socio-cultural context of learning, and the potential of the approach to lead to ineffective learning environments for students.

The international literature reveals that the learning styles approach has led to inappropriate stereotyping of minority students by teachers (e.g. minority students as kinaesthetic learners). As has been apparent in the best evidence synthesis, research evidence across curricular areas shows that appropriate opportunities to engage with concrete objects or demonstrations is highly related to learning, at critical developmental stages in learning processes, for all students, whether they be high, average, low or gifted achievers. The characterisation of kinaesthetic learning as an ethnically-based

78 Gottfredson, D.C., Birdseye, A.T., Gottfredson, G.D., & Marciniak, E.M. (1995). Increasing teacher expectations for student achievement. *Journal of Educational Research*, 88(3), 155-163.

79 Benton, R. (1986). Now fades the glimmering: Research in classrooms in New Zealand. *SET Research Information for Teachers*, 2(12).

80 Clay, M. (1985). Engaging with the school system: A study of interactions in New Zealand classrooms. *New Zealand Journal of Educational Studies*, 20(1), 20-38.

81 Millward, P., Neal, R., Kofoed, W., Parr, J., Kuin Lai, M., & Robinson, V. (2001). Schools learning journeys: Evaluating a literacy intervention at Dawson Road Primary School. *SET 2*, p. 39-42.

82 St. George, A. (1983). Teacher expectations and perceptions of Polynesian and Pakeha pupils and the relation of classroom behaviour and school achievement. *British Journal of Educational Psychology*, 53, 48-59.

83 Thomas, D. (1984) (Ed.). *Patterns of social behaviour: New Zealand and the South Pacific*. (Psychology Research Series, No. 17). Hamilton: University of Waikato.

84 Rietveld, C. (1994). From inclusion to exclusion: Educational placements of children with Down Syndrome. *Australian Journal of Special Education*, 18, 28-35.

85 Rietveld, C.M. (1999). Just leave him out! Inclusion in the junior classroom. What does it mean? *SET Research Information of Teachers*. Item 1. Wellington: New Zealand Council for Educational Research.

86 Good, T.L. (1987). Two decades of research on teacher expectations: Findings and future directions. *Journal of Teacher Education*, 38(4), 32-47.

87 Irvine, J. J., & York, D.E. (1995). Learning styles and culturally diverse students: A literature review. In J. Banks, & C. McGee (Eds.). *Handbook of Research on Multicultural Education*. MacMillan Publishing. (p. 487).

88 Riding, R., & Rayner, S. (1998). *Cognitive styles and learning strategies*. London: David Fulton Publishers.

89 Cited in Riding, R., & Rayner, S. (1998). *Cognitive styles and learning strategies*. London: David Fulton Publishers.

90 McMillan, B. (2001). The serious limitations of 'learning style'. *SET (1)* 36-39.

learner need is not supported by research evidence linked to student outcomes. However, such claims lead to inappropriate stereotypes, attributions and expectations for Māori students. For example, Mikaere and Loane (2001)⁹¹ reported, in relation to the learning of children from the Tuwharetoa iwi, that:

This aligns with and supports existing research conclusions that in general Māori were kinaesthetic learners ... Surprisingly, academic subjects such as maths were also popular. (p.20).

Higgins (2001)⁹², in her study of mathematics teaching at Year 3 in 10 Wellington classrooms, found that procedurally-oriented teachers 'were likely to regard a 'hands-on' approach as best meeting the needs of Māori and Pasifika children. The approach was variously described as active, 'hands on' or kinaesthetic and included chanting numbers and working with equipment'. (p.v). This finding is concerning in the light of Higgins' conclusion that the narrower, procedural hands-on approach was less effective in supporting student learning than a conceptual and child-centred approach that highlights children's thinking through interaction with equipment and emphasises the interrelationships between mathematical ideas. That is, inappropriate assumptions about ethnically-based learner needs can maintain the least effective learning opportunities for these students.

This appears to be a New Zealand example of the 'Matthew Effects' described by Phillips, McNaughton and MacDonald (2001)⁹³:

A ubiquitous phenomenon has been documented and elaborated in many studies. Termed Matthew Effects (Stanovich, 1986), it occurs when children who already know more about or are more skilled in an area on which instruction is focused, get more out of the instruction. These 'rich get richer and poor get poorer' patterns are seen when high-progress children make faster progress and get more access to more advanced and a wider range of instruction, and hence are able to learn even more. Low-progress children remain with more restricted instruction, fewer opportunities to boot-strap themselves up to the level of their peers. Unless instruction is carefully managed it becomes a default condition of classrooms. (p. 23).

Dilworth and Brown's (2001)⁹⁴ review of teaching and learning in culturally rich schools warns that:

An understanding of culturally defined learning styles does not provide an easily adaptable model for culturally responsive practice. Aside from the hazard of stereotyping youngsters and avoiding the more critical task of providing for individual differences, teachers may presume that students of certain backgrounds can only learn one way, thus depriving them of a broad repertoire of learning mechanisms. (p. 656).

The teacher establishes and follows through on appropriate expectations for learning outcomes and the pace at which learning should proceed

Phillips, McNaughton and MacDonald's (2001)⁹⁵ landmark work, linked to the achievement of literacy in the Strengthening Education in Mangere and Otara project, demonstrates that quality teaching can

91 Mikaere, B., & Loane, G. (2001). *Education in Tuwharetoa: A survey of students, parents, schools and communities*. For the Tuwharetoa Māori Trust Board and the Ministry of Education. Wellington: Ministry of Education.

92 Higgins, J. (2001). *Developing numeracy: Understanding place value*. Report to the Ministry of Education. Wellington: Ministry of Education.

93 Phillips, G., McNaughton, S., & MacDonald, S. (2001). *Picking up the pace: Effective literacy interventions for accelerated progress over the transition into decile 1 schools. Final report to the Ministry of Education on the Professional Development associated with the Early Childhood Primary Links via Literacy (ECPL) Project*. Auckland: The Child Literacy Foundation and the Woolf Fisher Research Centre.

94 Dilworth, M.E., & Brown, C. E. (2001). Consider the difference: Teaching and learning in culturally rich schools. In V. Richardson (Ed.). *Handbook of Research on Teaching (Fourth Edition)*. Washington D.C: American Educational Research Association.

95 Phillips, G., McNaughton, S., & MacDonald, S. (2001). *Picking up the pace: Effective literacy interventions for accelerated progress over the transition into decile 1 schools. Final report to the Ministry of Education on the Professional Development associated with the Early Childhood Primary Links via Literacy (ECPL) Project*. Auckland: The Child Literacy Foundation and the Woolf Fisher Research Centre.

ensure high standards for Pasifika and Māori and students from low SES families in a decile 1 school. The findings of that study show that teacher expectations are critical, both for the level of achievement possible and the pace at which learning should proceed. The Early Childhood Primary Link (Picking up the Pace) research-based teaching programme and its evaluation highlight the framing role of teacher expectations. It is important to note that while teacher expectations for high standards are necessary, expectations alone are insufficient to facilitate achievement. This intervention exemplifies high expectations integrated into quality teaching practices and demonstrates clear links between pedagogical practices and achievement outcomes. Such results are particularly noteworthy in the light of the long tradition of deficit attributions in the New Zealand educational literature.

Recent research suggests that problems around teacher expectations persist in New Zealand classrooms (Bishop, Berryman, Richardson, & Tiakiwai, in progress⁹⁶; McNaughton, Phillips & McDonald, 2000⁹⁷). In the course of an evaluation of a literacy programme in a decile 1 school, Millward, Neal, Kofoed, Parr, Kuin Lai and Robinson (2001)⁹⁸ found that teacher assessments of their Years 1 to 3 students' reading were unreliable and under-estimated the actual reading levels of students. The teachers and researchers identified the lack of externally referenced benchmarks and the absence of a standardised school-wide approach as impediments to effective evaluation. It is noteworthy that the teachers' underestimation of the children's skills were seen to reflect, amongst other concerns, their concern about low pre-entry student literacy skills. This study suggests that valid assessment has a key role in combating the kinds of deficit attributions that persist in New Zealand educational practice.

Significant research has been undertaken in Māori medium schooling to address the need for development and precision in the language and practice of diagnostic assessment. Rau, Whiu, Thomson, Glynn and Milroy (2001)⁹⁹ report a study designed to address the issue of 'standards being unrealistically too high or conversely, too low' (p. 10) for new entrants in Māori-medium settings. They focus on the need to be responsive to the heterogeneity of learners in Māori medium settings. Rau et al. (2001) identify five different language groups from Tainui entering schooling: children for whom Māori is their first and only language; children who have mixed competencies in more than two languages; children who have dual capacity in English and Māori; children for whom English is their first language but who also have some competency in the Māori language; and children for whom English is their first and only language, who will begin Māori language learning at school. These researchers investigated the appropriateness of the assessment tools available and the degree of consistency in their use (e.g. Pūkete Panui Haere). They then elaborated a detailed assessment framework for 10 levels on Nga Kete Korero, based on an empirical analysis, to clarify progressions and definitions of success.

Rau, Whiu, Thomson, Glynn and Milroy (2001) suggest a series of steps to develop appropriate assessment practices, and call for the further development of a 'corpus of specific language to describe and interpret children's achievement under the definitions of success' (p. 54).

The gathering and analysis of high-quality student achievement data and the use of externally referenced benchmarks have been found to be powerful tools in bringing about changes in teacher practice that facilitate higher achievement for students.^{100 101 102 103 104 105} Diagnostic or formative

96 Bishop, R., Berryman, M., Richardson, C. & Tiakiwai, S. (Work in Progress) *Te Kotahitanga: Year 9 and 10 Professional Development Programme. Te Kauhua Professional Development Evaluation*. Māori Education Research Institute (MERI), University of Waikato, Hamilton and Poutama Pounamu Research and Development Centre, Group Special Education, Tauranga.

97 McNaughton, S., Phillips, G., & MacDonald, S. (2000). Curriculum channels and literacy development over the first year of instruction. *New Zealand Journal of Educational Studies*, 35(1), 49-59.

98 Millward, P., Neal, R., Kofoed, W., Parr, J., Kuin Lai, M., & Robinson, V. (2001). Schools learning journeys: Evaluating a literacy intervention at Dawson Road Primary School. *SET 2*, p. 39-42.

99 Rau, C., Whiu, I., Thomson, H., Glynn, T., & Milroy, W. (2001). *He Ara Angitu: A description of success in reading and writing for five-year-old Māori medium students*. Report to the Ministry of Education. Wellington: Ministry of Education.

100 Heron, M., Hucker, J., Rooney, C., Robinson, V., Kuin Lai, M., Mose, K. (2001). Progressive Achievement Testing at Southern Cross Middle School. In *SET 2*. Wellington: NZCER.

101 Thomas, G. & Ward, J. (2001). *An Evaluation of the Count Me In Too Pilot*. Wellington: Learning Media.

102 Higgins, J. (2001). *An Evaluation of the Year 4 – 6 Numeracy Exploratory Study*. Wellington: Learning Media.

103 Millward P., Neal, R., Kofoed, W., Kuin Lai, M. & Robinson, V. (2001). Evaluating a Literacy Intervention at Dawson Road Primary School. In *SET 2*. Wellington: NZCER.

assessment can play an integral role in assisting the teacher to raise student achievement as long as the assessment practices are integrally embedded within, and facilitative of quality teaching, rather than an alternative focus. These findings are elaborated later in this synthesis and will be investigated further in a companion best evidence synthesis on professional development.

High expectations are necessary but insufficient, and can be counterproductive, when not supported by quality teaching

Achievement expectations (those held by both teachers and students) play a critical but complex role in educational achievement. Recent evidence from the *Programme for International Student Assessment (PISA 2000)*¹⁰⁶ underlines the message that raising teacher expectations alone is not a quick fix solution. Pressure of high expectations can pose a threat to student learning. The results show a small and inconsistent relationship between teacher expectations and student achievement across 32 countries. Notably for the New Zealand data, there was a negative relationship between high expectations and reading performance. Greater pressure was associated with worse reading literacy achievement across a national sample of New Zealand 15-year-olds.

International evidence also emphasises the complexity of teacher expectations and affirms the principle that teachers need high expectations for all learners but high expectations in themselves do not go far enough. High expectations need to be supported by effective and appropriate pedagogical approaches. In the U.S. the professional development programme *Teacher Expectations and Student Achievement (TESA)* has been widely implemented over the past two decades in an attempt to reduce disparity in educational achievement by race and gender. The focus of TESA is on changing teacher expectations and behaviours. Fifteen behaviours were selected for focus. Five selected behaviours focused on teacher management of 'response opportunities': equitable distribution of response opportunities, individual helping, response latency, delving and higher level questioning. Five behaviours focussed on teacher feedback: affirmation of correct performance, praise, reasons for praise, listening and accepting feelings. The third set of five behaviours focussed on personal regard: proximity, courtesy, personal interest, touching and desisting. These behaviours were selected because they were observed to be the kinds of practices teachers used with high achievers rather than low achievers and it was intended that the learning opportunities of low achievers would be optimised through enhanced teacher expectations and equitable treatment. The evidence of TESA impacts on student achievement has been mixed. Back in 1980, the developers of the programme found it to have a significant impact on lifting achievement in language arts for a sample of nearly 3000 students across different age groups in schooling (Kerman, Kimball & Martin, 1980, reported in Gottfredson, Birdseye, Gottfredson & Marciniak, 1995¹⁰⁷). However, Gottfredson, Birdseye, Gottfredson & Marciniak (1995) carried out a careful evaluation of the programme using comparison groups within the same schools and different schools for a range of outcomes for 306 students. Their results showed non-significant and even negative achievement effects. They concluded:

Our findings suggest that well-implemented TESA training delivered according to the specifications of the developers (Kerman et al. 1980) in the context of a high-level district support for the program model did not produce changes in teacher practices among the teachers participating in this study. (p. 162).

Research on teacher expectations has been fraught with these kinds of anomalous findings. High expectations are necessary but not sufficient to improve achievement for diverse learners. The research on quality teaching signals the importance of high expectations both for the standards that can be reached and the pace at which learning should proceed when accompanied by effective

104 Phillips, G., McNaughton, S., & MacDonald, S. (2001). *Picking up the pace: Effective literacy interventions for accelerated progress over the transition into decile 1 schools. Final report to the Ministry of Education on the Professional Development associated with the Early Childhood Primary Links via Literacy (ECPL) Project.* Auckland: The Child Literacy Foundation and the Woolf Fisher Research Centre.

105 William, D., & Lee, C. (2001). *Teachers developing assessment for learning: impact on student achievement.* Paper presented at the British Educational Research Association Meeting, University of Leeds.

106 Kirsch, I., de Jong, J., Lafontaine, D., McQueen, J., Medelovits, J., & Monseu, C. (2002). *Reading for change: Performance and engagement across countries. Results from PISA 2000.* Paris: OECD.

107 Gottfredson, D.C., Birdseye, A.T., Gottfredson, G.D., & Marciniak, E.M. (1995). Increasing teacher expectations for student achievement. *Journal of Educational Research*, 88(3), 155-163.

teaching. New Zealand educators need to break a pattern of inappropriately low expectations for some students, particularly Māori and Pasifika learners, low achievers and some students with special needs. External benchmarks, assessment, and, in particular, effective diagnostic and formative assessment can play a key, and necessary, but not sufficient role in supporting high achievement for diverse learners. Evidence about achievement is critical also to counter ineffective approaches, for example, inappropriately stereotyping students as kinaesthetic learners and targeting those students with less effective instructional opportunities. Another example is that of training teachers to change their behavioural repertoire without sufficient evidence that the new behaviour sets will be an effective strategy. Such findings emphasise the importance of attending to the research evidence linked to student achievement, and developing our knowledge of the kinds of pedagogical approaches that research reveals to be facilitative of the learning of heterogeneous groups of students. There is also a need for related best evidence synthesis work that identifies the kinds of support teachers need to enable diverse students to meet high expectations.

The nine characteristics of quality teaching that follow help complement the principle of high expectations with evidence about what enables learners and teachers to fulfil high expectations.

(II) Pedagogical Practices enable Classes and other Learning Groupings to work as Caring, Inclusive, and Cohesive Learning Communities.

Research-based characteristics

- Pedagogical practices create an environment that works as a learning community.
- Caring and support is generated through the practices and interactions of teacher(s) and students.
- Pedagogical practices pro-actively value and address diversity.
- Academic norms are strong and not subverted by social norms.
- Teaching and tasks are structured to support, and students demonstrate, active learning orientations.
- The teacher leads in representing 'us' as everyone in our class community.
- Teachers use class sessions to value diversity, and to build community and cohesion.
- Teachers use instructional organisation and task design to develop learning community.
- Teachers teach students how to provide help to each other with resource access, dialogue and elaborated explanations.
- Teaching includes training in collaborative group work with individual accountability mechanisms. Students demonstrate effective co-operative and social skills that enable group processes to facilitate learning for all participants.
- Pedagogical practice is appropriately responsive to the interdependence of socio-cultural and cognitive dimensions.

Pedagogical practices create an environment that works as a learning community

The learning community concept has arisen out of the research literature and denotes both a central focus on learning and the interdependence of the social and the academic in optimising learning conditions (Brophy, 2001)¹⁰⁸. The term 'learning community': (a) describes the kind of classroom where the peer culture has been developed by the teacher to support the learning of each member of the community, and (b) identifies a key change strategy that can help develop such a classroom culture. The notion of building a learning community emphasises not only the role the teacher takes in directly interacting with students, but also the key role the teacher's pedagogical approaches have in shaping peer culture within classrooms.

Caring and support is generated through the practices and interactions of teacher(s) and students

In her synthesis of research about the influences on student learning, Darling-Hammond (1997)¹⁰⁹ concluded that learning is supported when structures for caring, opportunities for collaborative learning and appreciation for diversity are established in classrooms. Wentzel (1997)¹¹⁰ carried out a longitudinal study of 248 middle school adolescents in the U.S. and found the students' perception of 'pedagogical caring' in their teachers to be strongly and significantly related to their motivation. Students perceived not only the teacher caring for them as an individual but also the teacher listening, caring about teaching, providing feedback and assistance and so on, as aspects of care. These aspects of what students perceived to be 'caring' are inextricably related to quality teaching practices but signal the importance of care and support. Wentzel points out that such results are apparent in the research not only for minority and low achieving students, but for all students regardless of race or family background.

Hohepa, Hingaroa Smith, Tuhiwai Smith and McNaughton (1992)¹¹¹ reported the ways in which language development is embedded within cultural and social processes in Māori medium education in kohanga reo¹¹². This study is particularly significant for this best evidence synthesis because of the evidence of higher achievement of Māori in Māori-medium settings rather than English or bilingual

108 Brophy, J. (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8.* New York: Elsevier.

109 Darling-Hammond, L. (1997). *The right to learn: A blueprint for creating schools that work.* San Francisco: Jossey-Bass Publishers.

110 Wentzel, K.R. (1997). Student motivation in middle school: The role of perceived pedagogical caring. *Journal of Educational Psychology*, 89 (3), 411-419.

111 Hohepa, M., Smith, G.H., Tuhiwai Smith, L., & McNaughton, S. (1992). Te Kohanga Reo Hei Tikanga Ako i Te Reo Māori: Te Kohanga Reo as a context for language learning. *Educational Psychology*, 12 (3 & 4), 333-346.

112 Māori medium early childhood centres: 'language nests'.

medium education at Years 11 and 12 in 2000 and 2001 examination results¹¹³. There also appears to be a congruence between the high rates of interactions exemplifying *awhina*¹¹⁴ and *whanaungatanga*¹¹⁵ in Kohanga reo and the evidence of higher rates of positive evaluations found to be occurring in primary immersion classrooms than in bilingual or mainstream contexts, discussed later in this synthesis¹¹⁶.

Hohepa et al. (1992) reported the frequency with which the concepts of *awhina*, *whanaungatanga* and *tuakana/teina*¹¹⁷ were exemplified in the interactions between teacher and students, and student-to-student interaction in Kohanga Reo. Instances exemplifying *whanaungatanga* occurred at a rate of almost one every 10 minutes. The 'ko wai au' routine¹¹⁸ was observed formally in the *mihimihi* (formal group greeting session) which provides a routine 'miniscript' – a chance 'to experience and analyse spoken language in predictable and recurring contexts' (p.344). This study, which makes explicit the way in which a cultural practice of community building can be embedded in teaching, has significant implications for questions raised by national achievement outcome data, which shows high levels of bullying and verbal intimidation in New Zealand schools by international comparison¹¹⁹. The issue has been highlighted also by a recent survey of beginning teachers¹²⁰, many of whom did not perceive reinforcing the shared values of the New Zealand Curriculum Framework to be applicable to their teaching. Less than half of first year New Zealand secondary teachers felt well-prepared to reinforce caring amongst their students and five per cent did not see this shared value as applicable to their teaching.

There is evidence that negative social interactions between students directly interfere with learning. Alton-Lee and Nuthall (1990)¹²¹ reported a systematic analysis of the relationship between Year 7 Pakeha and Māori students' giving and receiving of verbal abuse (mostly racist remarks) and learning outcomes in social studies. For the students receiving the verbal abuse, no such remarks occurred during the time they spent on content learned and remembered a year later. About two abusive comments per hour occurred during time spent on concepts that appeared to be learned but were forgotten a year later, and the highest rate, almost three abusive comments per hour, occurred during time spent on concepts that were not learned. Interestingly, for the *giver* of abuse the frequency of giving abuse was greatest for time spent on concepts not learned, particularly those that appeared to be learned but were forgotten a year later. While some forms of abuse are not only in contravention of the requirements for safe physical and emotional environments in New Zealand schools, the shared values of the New Zealand Curriculum Framework and legislation, abusive behaviour can inhibit learning for all involved.

Pedagogical practices pro-actively value and address diversity

The dual dimensions of care and valuing of diversity are core features of a learning community. Caring practices alone are insufficient to create an environment that supports the learning of diverse students. McIntyre (1997)¹²² reported that white teachers in the U.S. found very distressing the notion that their deep ethic of care and concern for students did not of itself address cultural inclusion or combat racism.

113 Ministry of Education (2001). *New Zealand Schools Nga Kura O Aotearoa. A report on the compulsory school sector in New Zealand 2000*. Ministry of Education: Wellington. (p.98). See also Ministry of Education (2002). *New Zealand Schools Nga Kura O Aotearoa. A report on the compulsory school sector in New Zealand 2001*. Ministry of Education: Wellington

114 *Awhina* is expressed through 'verbal (and non-verbal) behaviour which displayed affection, expressed concern, or expressed desire to or for help' (Hohepa et al. (1992, p. 336).

115 *Whanaungatanga* 'expresses or reinforces identity as part of a family group - includes blood ties but also belonging to, and responsibilities associated with participating in community' (Hohepa et al (1992, p. 336).

116 Carkeek, L., Davies, L., & Irwin, K. (1994). *What happens to Māori girls at school? An ethnographic study of the school-based factors affecting the achievement of Māori girls in immersion, bilingual, and mainstream primary school programmes in the Wellington Region*. Final Report to the Ministry of Education. Wellington: Ministry of Education.

117 Reciprocal older and younger roles originally meaning older and younger sibling roles.

118 Hohepa et al. (1992). (e.g. :Ko wai au", a "Who am I?" routine: Ko ___ tooku ingo My name is ___. Ko ___ oku maatua. My parents are ___. Ko ___ tooku iwi. My tribe is ___.) (p. 335).

119 Martin, M.O., Mullis, I.V.S., Gonzales, E.J., Sritth, T.A., & Kelly, D.L. (1999). *School contexts for learning and instruction: IEA's Third International Mathematics and Science Study (TIMSS)*. Chestnut Hill, MA: TIMSS International Study Center, Boston College.

120 Gray, A., & Renwick, M. (1998). *A study into the effectiveness of teacher education programmes*. Wellington: Report to the Ministry of Education Gray Matter Research and Renwick Consultants. Wellington: Ministry of Education.

121 Alton-Lee, A., & Nuthall, G. (1990). Pupil experiences and pupil learning in the elementary classroom: An illustration of a generative methodology. *Teaching and Teacher Education: An International Journal of Research and Studies*, 6(1), 27-45.

122 McIntyre, A. (1997). Constructing an image of a white teacher. *Teachers College Record*, 98(4), 653-681.

That caring is a necessary but insufficient approach to create learning communities for diverse learners was a challenge addressed by Brophy (2001).¹²³ Brophy initially concluded from his edited collection of research reviews that:

Productive contexts for learning feature an ethic of caring that pervades teacher-student and student-student interactions and transcends gender, race, ethnicity, culture, socio-economic status, handicapping conditions, and other individual differences. Students are expected to assume individual and group responsibilities for managing instructional materials and activities and for supporting the personal, social and academic well-being of all members of the classroom community. (p.6).

Contributors to Brophy's reviews challenged his use of the term 'transcends' in the quote above. Freedman and Daiute (2001)¹²⁴ reviewed research on effective pedagogy for teaching writing in the light of the integral role of literacy in democratic community. They concluded that 'diversity must be addressed rather than transcended' (p.86). Freedman and Daiute (2001) explain that because many students bring with them oral and language practices that are different from those valued in the formal writing genres of schools and workplaces, addressing diversity is the key pedagogical strategy for effective instructional approaches in writing. They report a variety of studies where effective teaching has built upon the language practices of diverse students (e.g. developing meta-linguistic reflective language through analyses of texts using African American English Vernacular practices¹²⁵, portfolio assessments of Navajo students exemplifying both non-Native and Native communication skills).¹²⁶

Freedman and Daiute (2001) made explicit the role of writing as a social as well as a literacy skill. They reviewed research on the effective use of narrative writing as a strategy (within mainstream curriculum rather than as an add-on) for enabling students to deal more effectively with peer conflict¹²⁷.

In the light of this critique from the research on effective writing instruction, Brophy (2001) revised his view to include honouring the diversity of students as central to quality teaching. This change reflects not only the compelling evidence about the centrality of socio-cultural processes in writing instruction, but also the strength of evidence emerging across the curriculum.

Academic norms are strong and not subverted by social norms

Some of the strongest recent research on the development of learning communities has arisen in mathematics education. For example, Stein (2001)¹²⁸ explains:

Knowing mathematics means valuing mathematics, appropriately using and making mathematics, and developing an identity for oneself as an expert member of a community whose practices embody mathematical values and modes of thinking (e.g. modelling; using symbols; engaging in inference; logical analysis and mathematical argumentation). (p.114).

Stein (2001) points out that, while research shows that mutual respect and trust provide an environment where learning can be optimised, they must be additive to academic or disciplinary norms – in the case of her review focus, mathematical norms.

123 Brophy, J. (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8.* New York: Elsevier.

124 Freedman, S.W., & Daiute, C. (2001). Instructional methods and learning activities in teaching writing. In J. Brophy (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8.* New York: Elsevier.

125 Lee, C.D. (1993). *Signifying as a scaffold for literacy interpretation: The pedagogical implications of an African American Discourse Genre.* Urbana, IL: National Council of Teachers of English.

126 Koesch, N., and Trumbull E. (1996). Portfolios: bridging cultural and linguistic worlds, In R. Calfee & P. Perfumo (Eds.), *Writing portfolios in the Classroom: Policy and Practice, Promise and Peril.* Mahwah, NJ: Laurence Erlbaum Associates.

127 Daiute, C. (2000). Narrative sites for youths' construction of social consciousness. In M. Fine & L. Weiss (Eds), *Construction Sites: Excavating class, race, gender, and sexuality among urban youth.* New York: Teachers College Press.

128 Stein, M.K. (2001). Teaching and learning mathematics: How instruction can foster the knowing and understanding of number. In J. Brophy (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8.* New York: Elsevier.

A 'culture of niceness' can undermine learning both in teacher-student interaction and student-student interaction. Academic norms can be subverted by teachers when they encourage students to participate publicly by accepting and giving praise for any answer at all in class discussion. Doyle (1983)¹²⁹ reviewed research showing the problem that occurs when students learn that just giving an answer is the task. Genuine intellectual engagement with curriculum is undermined.

Minstrell and Kraus (2001)¹³⁰, in reviewing research on effective physics teaching, identify the 'delicate balance' that expert teachers manage to maintain when they encourage and support expression of ideas whilst ensuring critical thinking about the ideas. They explain the role that wait-time (which has been shown to increase student achievement), and enabling students opportunities to reflect further and elaborate, can play in supporting deeper learning, especially for previously low-achieving students.

While name-calling and abusive behaviour have shown negative relationships to student outcomes, intellectual disagreements and conflict are vital to the learning process. In her review of research, Stein (2001)¹³¹ warns that if social norms and a 'culture of niceness' displace rather than support mathematical norms, such as standards of reason, rules of practice, and valuing of mathematical knowledge, then the kind of disagreement necessary to resolve cognitive conflict may be perceived as unfriendly. The research indicates that, when conceptual disagreements cannot be addressed, learning can be at risk.

The interface between the social world and the cognitive processes of students is a critical influence on student achievement. Both a 'culture of niceness' and cultural practices of bullying and power abuse can subvert learning. In one New Zealand study in science education, a Year 5 Māori student was highly motivated to succeed at a task but arbitrated over a disagreement about cloud type by threatening to thump another student if she did not agree with his classification¹³². Students need teacher modelling and explicit teaching that evidence, rather than power, should be used to resolve intellectual conflict in order to genuinely assist the learning process and develop a peer learning culture.

In the example given above, peer discussion was focussed on the science task – cloud classification. But many classroom observations reveal peer discussions of low achievers to be focussed on social matters unrelated to the task, or related to aspects of task presentation or production (colour, shading, borders, underlines) that are not critical to the learning goals^{133 134}. In such cases peer social norms become prominent and academic norms are undermined.

Teaching and tasks are structured to support, and students demonstrate, active learning orientations

Skilled teachers structure and sequence instructional tasks to motivate diverse learners to maintain intellectual engagement with the curriculum content as part of the social interaction of seating or working groups. For example, one Christchurch teacher of Year 7 students optimised the intellectual engagement of students with the instructional topic by skilled task sequencing. She sequenced a session focused on the title page and illustrative art work immediately after a whole class session where student questions about the topic were elicited, recorded and mounted at the front of the

129 Doyle, W. (1983). Academic work. *Review of Educational Research*, 53, 159-199.

130 Minstrell, J., & Kraus, P. (2001). The teaching and learning of physics. In J. Brophy, (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching*. Vol. 8. New York: Elsevier.

131 Stein, M.K. (2001). Teaching and learning mathematics: How instruction can foster the knowing and understanding of number. In J. Brophy (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching*. Vol. 8. New York: Elsevier.

132 Alton-Lee, A. G., Nuthall, G.A., & Patrick, J. (1999). Reframing classroom research: A lesson from the private world of children. In Ethan Mintz & John T. Yun (Eds.). *The Complex World of Teaching: Perspectives from Theory and Practice*. Massachusetts Cambridge, MA: Harvard Educational Review.

133 Alton-Lee, A. G., Nuthall, G.A., & Patrick, J. (1999). *Ibid*.

134 Anderson, L. (1981). *Student responses to seatwork: Implications for the study of students' cognitive processing*. Paper presented at the annual meeting of the American Educational Research Association, Los Angeles, California.

classroom. Students continued to discuss, debate and elaborate on their questions and possible strategies for finding answers as they worked individually on their project title pages¹³⁵.

The consideration of evidence around promoting learning orientations is given in depth later in this synthesis. The key point for this section is that the teacher's approach to planning, organising and sequencing tasks, of itself, can play a key role in promoting learning orientations and learning community.

The teacher leads in representing 'us' as everyone in our class community

The teacher has a key role in representing class community to the students, and with the students, in ways that do not exclude by ethnicity, gender, dis/ability, social class background or sexuality. In a series of studies in New Zealand classrooms, observations and audio-microphone data have shown well-meaning teachers to play key if inadvertent roles in creating environments that are divisive and support racism and abuse. Alton-Lee, Nuthall and Patrick (1998)¹³⁶ found that the Pakeha teacher's inadvertent use of the pronoun 'we' to mean 'Europeans, white men' excluded from the 'we' of the classroom community a Māori student, who immediately became the object of racist abuse from his peers who noticed and exploited the exclusion. This finding significantly implicated both the social studies curriculum content and inadvertent teacher behaviour in facilitating sustained racist bullying.

New Zealand teachers need a 'we' that is inclusive of those of us who are Māori, Pakeha, Tokelauan, Tongan, Japanese, Dutch, Cantonese, Somali, or have multiple ethnic heritages – or whatever ethnicity and ethnic heritages are part of our particular class community. The tradition of 'us' and 'othering' that can be signalled through exclusive, albeit unconscious, language use (e.g. Johnstone, 1987)¹³⁷ provides a foundation for bullying, name-calling, racism, and practices that lead to patterns of social and academic exclusion.

Exclusions that inhibit student learning and undermine student identity can occur when, ostensibly through their special needs, some students are 'othered' and classified as 'not like us'. Rietveld's research in New Zealand classrooms (1994¹³⁸; 1999¹³⁹; doctoral research in progress¹⁴⁰) documents contrasting examples of inclusion and exclusion for students with Down Syndrome and the educational consequences of the alternative approaches. Rietveld links many teacher exclusionary practices to an inappropriate personal tragedy model of disability and reports examples of teachers and peers cuddling students with Down Syndrome rather than treating the student in age-appropriate ways and responding to educational needs as for other students. Although well-intentioned, such responses can deny dignity, respect and educational opportunities to students. Educational rather than personal tragedy-type responses are shown by Rietveld to enhance learning outcomes for both students with Down Syndrome and their peers.

The concept of learning community moves away from distinctions between the 'mainstream' and the 'included disabled'. Rather, difference and diversity become central to our understanding of community. Town (1998)¹⁴¹ identified the shift in thinking required of educators as a universalising discourse of difference, within which programmes are designed to meet the diverse and fluid educational needs of all students. Such a shift in thinking is needed to underpin language and instructional practices that are inclusive of diverse learners.

135 Alton-Lee, A.G. with McBride, T., Greenslade, M. and Nuthall, G. (1997). *Gendered discourses in social studies: intermediate students' learning and participation during studies of Antarctic work and survival focused on women*. Report to the Ministry of Education. Understanding Learning and Teaching Project 3. Wellington: Ministry of Education.

136 Alton-Lee, A. G., Nuthall, G.A., & Patrick, J. (1999). Reframing classroom research: A lesson from the private world of children. In Ethan Mintz & John T. Yun (Eds.). *The Complex World of Teaching: Perspectives from Theory and Practice*. Massachusetts Cambridge, MA: Harvard Educational Review.

137 Johnstone, R. (1987). 'They don't eat like us'. Prejudice and a social studies unit. *SET Research Information for Teachers*, 1 (7).

138 Rietveld, C.M. (1994). From inclusion to exclusion: educational placements of children with Down Syndrome. *Australian Journal of Special Education*, 18. 28-35.

139 Rietveld, C.M. (1999). Just leave him out! Inclusion in the junior classroom. What does it mean? In *SET Research Information for Teachers*. Item 1. Wellington: New Zealand Council for Educational Research.

140 Rietveld, C.M. (in progress). *The transition to school for children with Down Syndrome: a challenge to regular education*. Unpublished doctoral dissertation in progress, University of Canterbury, Christchurch.

141 Town, S. J. H. (1998). *Is it safe to come out yet?: the impact of secondary schooling on the positive identity of ten young gay men, or that's a queer way to behave*. Unpublished doctoral dissertation. Victoria University: Wellington. See also Alton-Lee, A., Rietveld, C., Klenner, L., Dalton, N., Diggins, C. & Town, S. (2000). Inclusive practice within the lived cultures of school communities: research case studies in teaching, learning and inclusion. *International Journal of Inclusive Education*, 4 (3), 179-210.

Teachers use class sessions to value diversity, and to establish and build community and cohesion

Effective use of teacher-student discussion in whole class contexts enables diversity of student experience to be valued and to be a resource to support student achievement gains. Alton-Lee, Diggins, Klenner, Vine and Dalton (2001)¹⁴² traced the links between New Zealand teacher Lena Klenner's skilful management of a student seating pattern, and use of wait time and prompts, to enable Huhana, a five-year-old Māori student, to feel sufficiently valued and safe to participate in a whole class discussion. The teacher enabled the initially reluctant Huhana to share her knowledge, enabling other students such as Brian, a Pakeha student, to learn and understand a concept for which he did not have direct personal experience. This finding counters the sustained pattern of differential interaction between New Zealand mainstream teachers and Māori students. The study raises the question about the inappropriateness of failing to engage and challenge Māori students because of a presumed sensitivity to a child's experience of being whakamā (experiencing shame and abasement - in this case, through being publicly selected to speak). The management of safe participation and avoidance of practices which shame or humiliate students publicly is seen to be important for all students.

Teachers use instructional organisation and task design to develop learning community

Bossert (1979)¹⁴³, in a landmark study of social relationships in classrooms, found that the task and activity structure played the key role in shaping student relationships and engagement. Bossert's observations over subsequent school years showed the task structures rather than the students' personalities to shape peer interaction. Student friendship patterns and peer status were directly shaped by the teacher's instructional design, task format, task management, the rationale for group membership, and grouping practices. He revealed multi-task environments to enable diverse students to variously perform well because the multiple tasks engaged different student strengths at different times. In these environments friendship patterns tended to be more fluid and cooperative. When single task large group formats prevailed, fixed academic hierarchies formed influencing friendship patterns and academic status shaped by the teacher's public evaluations. Students became more competitive and less inclined to help, or associate with, many other class members.

The particular types and approaches to instruction in Bossert's classes, for example, public recitation, would not be likely to translate directly into the New Zealand context. However, the underpinning principle that social relationships are shaped by task organisation does apply, and we need to understand better such a key influence on peer culture in the New Zealand context.

Research in New Zealand is increasingly showing that task design plays a central role in structuring and developing an effective learning community. The social and the cognitive are not distinct domains in practice, but are integrated and embedded in task and activity design and classroom organisation. In his monograph synthesising the relationship between student experiences in classroom and learning outcomes, Nuthall (1999)¹⁴⁴ emphasized the need for teachers to design tasks to increase levels of trust, acceptance, sharing and mutual support between students. Teachers can generate and provide a wide variety of curriculum-relevant tasks that disrupt hierarchies developing between students and enable diverse valuing of student knowledges and skills (Nuthall, 1999)¹⁴⁵.

Taplin (1999)¹⁴⁶ provided examples of teacher practices that can integrate values education into mathematics and develop peer cultures as learning communities. These practices included: managing resource access, developing students' skills in co-operative group work, developing perseverance in students, and the management of reciprocal problem solving roles with boys and girls of different ethnicities.

142 Alton-Lee, A., Diggins, C., Klenner, L., Vine, E., & Dalton, N. (2001). Teacher management of the learning environment during a social studies discussion in a new-entrant classroom in New Zealand. *Elementary School Journal*, 101 (5), 549-566.

143 Bossert, S. (1979). *Tasks and social relationships in classrooms: A study of instructional organisation and its consequences*. London: Cambridge University Press.

144 Nuthall, G. (1999). Learning how to learn: The evolution of students' minds through the social processes and culture of the classroom. *International Journal of Educational Research*, 31(3), 139-256.

145 Nuthall, G. (1999). Learning how to learn: The evolution of students' minds through the social processes and culture of the classroom. *International Journal of Educational Research*, 31(3), 139-256.

146 Taplin, M. (1999). Integrating values education into the mathematics classroom. *SET*, 2 (10).

Teachers teach students how to provide help to each other with resource access, dialogue and elaborated explanations

In a synthesis of research, Webb (1991)¹⁴⁷ found that helping other students (giving an explanation of an idea, method or solution) was positively related to achievement for the giver of help, although the student receiving the help only benefited when the help included an elaborated explanation rather than an answer. Webb found the effectiveness of group work to be related to teacher training of students to give and receive help appropriately. When students received no feedback or irrelevant feedback, that is feedback unrelated to the task, such feedback was negatively related to achievement. Webb's finding is particularly important because it shows the potential benefit to high achievers as well as low achievers, when students are effectively trained to participate in co-operative interaction.

A recent review of research on special education teaching has highlighted the increasing awareness of the significance of peer dialogue in enhancing performance (Gersten, Baker, Pugach, Scanlon & Chard, 2001)¹⁴⁸. These reviewers cite studies emphasising the importance of peers working together and the impact that results, which is specifically over-and-above that possible through the direct contribution of the teacher. The teacher's role is to train students to engage in dialogue that supports cognitive and metacognitive strategies. Gersten et al. (2001) cite research by Wong, Butler, Ficzere and Kuperis (1997)¹⁴⁹ tracing the impact of a multicomponent strategy to develop the quality of essay writing by students with learning disabilities in grades 9 and 10:

Pairs of students took turns assuming the role of teacher-critic and checked each other's work for clarity, lack of ambiguity, and use of conventions. Wong et al. (1997) also included three phases of instruction starting with extensive teacher modelling and thinking aloud, and moving towards collaborative planning with a partner and revisions that were based on feedback from the partner. Elaborated dialogue was a key feature of each phase.

This multicomponent intervention led to significant growth in the quality of writing. This growth was maintained over time. Students' metacognitive awareness of the writing process showed significant growth. The differences in performance between prewriting and postwriting samples were significant, with strong effects found for clarity (effect size of 1.70), appropriateness of ideas (1.71) and organisation (2.49). This...further demonstrates the integration of explicit instruction and socially mediated instruction. (p. 705).

The National Education Monitoring Project findings¹⁵⁰ show substantial between-decile contrasts in student writing achievement in New Zealand schools. We need to develop more effective pedagogical approaches that enable low achievers to benefit from and become active contributors to a learning community that facilitates better writing skills. Such findings about the potential of peer dialogue (facilitated by teacher structuring, task design, teacher modelling, and training) to enhance achievement are becoming more evident in research across the curriculum.

In their review of classroom research in the visual arts Colbert and Taunton (2001)¹⁵¹ concluded:

'studies concerned with the context in which art learning takes place have shown the importance of the combined influences of teachers and peers in the standards for art learning behaviours and artwork produced...the effects of student-student interactions were found to be as important as student-teacher interaction' (p. 521).

147 Webb, N.M. (1991). Task-related verbal interaction and mathematics learning in small groups. *Journal for Research in Mathematics Education*, 22, 366-89.

148 Gersten, R., Baker, S., Pugach, M., Scanlon, D., & Chard, D. (2001). Contemporary research on special education teaching. In V. Richardson (Ed.), *The Handbook of Research on Teaching (Fourth Edition)*. Washington D.C. American Educational Research Association.

149 Wong, B.Y.L., Butler, D.L., Ficzere S.A. & Kuperis, S. (1997). Teaching adolescents with learning disabilities and low achievers to plan, write, and revise compare-contrast essays. *Learning Disabilities Research and Practice*, 12(1), 2-15.

150 Crooks, T. (2002). *Submission to the Select Committee Inquiry into Decile Funding in New Zealand Schools*. Otago: National Education Monitoring Project.

151 Colbert, C., & Taunton, M. (2001). Classroom research in the visual arts. In V. Richardson (Ed.), *The Handbook of Research on Teaching (Fourth Edition)*. Washington D.C. American Educational Research Association.

The research on the impact of peer interaction on student learning outcomes shows marked variation depending on the skill of the teacher in promoting constructive peer interaction and thoughtful peer dialogue around curriculum ideas. In their review of the impact of peer effects on student outcomes Wilkinson, Hattie, Parr, Townsend, Thrupp, Lauder and Robinson (2000)¹⁵² identify four instructional approaches, and variations upon them, that illustrate ways in which teachers can 'capitalise on peer effects to maximise learning' (p. 120) across different curricular areas. These are:

- reciprocal teaching (scaffolding student structured and reciprocal participation in dialogue using questioning, summarising, clarifying and predicting)¹⁵³;
- collaborative reasoning (teachers structure classroom opportunities to optimise discussion amongst peers)¹⁵⁴ ¹⁵⁵
- Fostering a Community of Learners (teachers use multiple strategies such as jigsaw learning groups to which each child brings a resource needed by others, cross-talk and cross-age tutoring to foster collaboration and the distribution of peer expertise)¹⁵⁶
- Computer Supported Intentional Learning Environments (support for intentional learning and cognitive strategy use through student use of computer technology)¹⁵⁷

Wilkinson, Hattie, Parr, Townsend, Thrupp, Lauder and Robinson (2000) emphasised the evidence of higher-level cognitive processes, enhanced learning outcomes and increased interest when peer collaboration is effectively facilitated. Examples of these learning community development strategies, and variations on them, are elaborated further in the course of this synthesis to illustrate specific influences on learning outcomes.

Teaching includes training in collaborative group work with individual accountability mechanisms. Students demonstrate effective co-operative and social skills that enable group processes to facilitate learning for all participants.

Cohen (1986)¹⁵⁸ demonstrated the greater impact on achievement possible when student collaboration and dialogue are structured by teachers. She provided an early research-based approach to structuring group work, resources, and tasks, to distribute and facilitate intellectual leadership amongst heterogeneous groups. Her approach to complex instruction used bilingual written task instructions as a matter of course. The approach used specific training and accountability strategies to optimise student participation in, and benefit from, group work. Cohen is specific about the size of groups. Cohen (1994)¹⁵⁹ sharply differentiates cooperative group work from students interacting while sitting together working on individual tasks. She defines cooperating as 'students working together in a group small enough that everyone can participate on a collective task that is clearly assigned ' (p. 3). In Cohen's model teachers are required to use a continuous reflective model with students that requires evaluation of the group process skills. Cohen (1994)¹⁶⁰ has synthesised the evidence about the conditions of co-operative groupwork that optimise achievement for different outcomes. For example, some closely micro-managed strategies for group interaction have been shown to increase achievement for more routine learning tasks, but can inhibit conceptual learning. Cohen's finding is that when conceptual learning is the focus, the use of tasks with ill-structured solutions (not simple, structured answers, but real life and complex solutions) can maximise the effectiveness of the co-operative groupwork.

152 Wilkinson, I., Hattie, J., Parr, J., Townsend, M., Thrupp, M., Lauder, H., & Robinson, T. (2000). *Influence of peer effects on learning outcomes: A review of the literature*. Report prepared for the Ministry of Education, Auckland: Auckland Uniservices Ltd. Wellington: Ministry of Education.

153 Palincsar, A.S., & Brown, A.L. (1984). Reciprocal teaching of comprehension -fostering and comprehension-monitoring activities. *Cognition and Instruction*, 1(2), 117-175.

154 Commeyras, M. (1994). Promoting critical thinking through dialogical thinking reading lessons. *Reading Teacher*, 46, 486-494.

155 Putnam, R., Lampert, M., & Peterson, P. (1990). Alternative perspectives on knowing mathematics in elementary schools. *Review of Research in Education*, 16, 57-150.

156 Brown, A.L., & Campione, J.C. (1994). Guided discovery in a community of learners. In K. McGilly (Ed.), *Classroom lessons: Integrating cognitive theory and classroom practice* (pp. 229-270). Cambridge, MA: Bradford Book, MIT Press.

157 Scardamalia, M., & Bereiter, C. (1991). Computer support for knowledge building communities. *Journal of the Learning Science*, 3(3), 265-283.

158 Cohen, E. (1986). *Designing groupwork*. New York: Teachers College Press.

159 Cohen, E. (1994). Restructuring the classroom: Conditions for productive small groups. *Review of Educational Research*, 64 (1), 1-35.

160 Cohen, E. (1994). Restructuring the classroom: Conditions for productive small groups. *Review of Educational Research*, 64 (1), 1-35.

Pedagogical practice is appropriately responsive to the interdependence of socio-cultural and cognitive dimensions

Imo (1996)¹⁶¹ carried out an action research study in her New Zealand intermediate class using the Interactive Teaching Approach (discussed later in this synthesis). She gathered intensive data on four case study Year 8 Samoan 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' (well-being, spirit) 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, rather than generating their own questions.

The high prevalence of negative social outcomes (e.g. rates of verbal intimidation and physical assault)¹⁶² ¹⁶³ evident in international comparisons for students in New Zealand schooling suggests insufficient attention to the interdependence of the social and the academic in many New Zealand schooling contexts.

Hohepa, Hingaroa Smith, Tuhiwai Smith and McNaughton's (1992)¹⁶⁴ analysis of the integration of cultural norms of whanaungatanga, awhina and tuakana/teina into language learning demonstrates the importance of making explicit and developing the socio-cultural norms that support students, not only in strong cultural identity and social development but also in their achievement. This principle underpins the development of learning community whatever the cultural and language heritage of the learners. Hohepa et al. (1992) show how the teacher's pedagogical skill, particularly in scaffolding student learning, is a key to ensuring a positive and affirming social environment while optimising academic challenge.

Tasker (2001)¹⁶⁵ carried out an in-depth New Zealand study of Year 12 student learning within the health curriculum. Her work emphasises the interdependence of the cognitive and the affective in the New Zealand secondary context. The outcomes from the programme were very strong. Students increased their knowledge, and shifted markedly from the homophobic attitudes they brought into the class programme. Students who were already sexually active reported increased condom use. Tasker identified the skill of an experienced, trusted and capable teacher as critical to creating a supportive affective environment needed to enable such shifts to occur. Tasker explored the inter-relation between feeling and thinking in all aspects of the unit taught and identified the teacher's approach as one facilitating emotional literacy:

The teacher was central to the achievement of effective learning through her pedagogical expertise and her ability to establish a quality emotional relationship with her students and between them. (p. ii).

In a range of studies in different curricular areas reported in this synthesis it is evident that social norms developed within the peer culture mediate achievement. In her contribution to the *Handbook of*

161 Imo, L. (1996). *What's in a question?* Wellington: Unpublished in-service action research report, EDUC 352 Theory into practice. Wellington: Victoria University Department of Teacher Education.

162 Chamberlain, G., Chamberlain, M., & Walker, M. (2001). *Trends in Year 5 students' mathematics and science achievement: Results from a New Zealand study based on the Third International Mathematics and Science Study*. Wellington, Comparative Education Research Unit, Ministry of Education.

163 Martin, M.O., Mullis, I.V.S., Gonzales, E.J., Smith, T.A., & Kelly, D.L. (1999). *School contexts for learning and instruction in IEA's Third International Mathematics and Science Study*. Boston College: TIMSS International Study Center.

164 Hohepa, M., Hingaroa Smith, G., Tuhiwai Smith, L., & McNaughton, S. (1992). Te Kohanga Reo hei Tikanga ako I te Reo Māori: Te Kohanga Reo as a context for language learning. *Educational Psychology*, 12 (3 & 4): 333-346.

165 Tasker, G. (2001). *Students' experience in an HIV/AIDS sexuality programme: What they learnt and the implications for teaching and learning in health education*. Unpublished doctoral thesis. Wellington: Victoria University.

Research on Teaching Shepard (2001)¹⁶⁶ emphasises the role of social norms in fostering not only cognitive abilities but also the development of ‘important dispositions, such as students’ willingness to persist in trying to solve difficult problems, and their identities as capable learners.’ (p. 1095). Much emphasis is given to learner dispositions in Te Whariki, the early childhood curriculum, and many of these are explicitly emphasised in the essential skills of the New Zealand Curriculum Framework. The role of learning community in developing such dispositions merits particular consideration in the light of evidence that dispositions supported in early childhood education can become at risk in New Zealand junior schools (Carr, 1997)¹⁶⁷. Making transparent the role of the teacher in developing a peer culture that supports learning dispositions is also timely in the light of feedback from teachers and principals to the Curriculum Stocktake and the Education Review Office that the essential skills are less emphasised and often poorly taught in New Zealand schooling.

In summary, learning communities provide environments that facilitate achievement. The term 'learning community' denotes an unrelenting focus¹⁶⁸ on, and active orientation to, learning and describes the kind of classroom where community building supports academic and social outcomes. The peer culture has been developed by the teacher to support the learning of each member of the community. The teacher has a key role to play in creating a community that does not generate 'us' and 'other' distinctions but includes those of 'us' whatever our cultural identity, who are part of our community. Diversity is valued, addressed and integral to instructional strategies. Caring and support is integrated into pedagogy and evident in the practices of teachers and students.

In a learning community, academic norms are strong and not subverted by social norms. Students are enabled to express and process dissenting views. Disagreements around curriculum are valued and cognitive conflict is seen as a resource central to the learning process. A learning community is neither stymied by a 'culture of niceness' that impedes learning nor undermined by peer abuse and intimidation. Teachers play a central role in training students in strategies to ensure social norms support rather than subvert academic norms, both through direct instruction and through the structuring of the academic and task environment.

The research showing the interdependence of the social and the academic is not confined to better outcomes for particular curriculum areas, class levels or particular groups of students. This synthesis has provided evidence for learning disabled, low and high achievers. Monks, Heller, and Passow's (2000)¹⁶⁹ reflection on a wide body of research about provisions for gifted students and educational outcomes identifies the importance of social and affective influences in the achievement of gifted students. They note that many of the educational provisions for gifted students have failed to attend to the balance between cognitive and affective, with the cost of inhibiting talented performance.

There is strong evidence of the positive impact of teacher and student development of effective learning communities, not just for some learners, but across the range of diverse learners, and for heterogeneous groupings of learners.

166 Shepard, L.A. (2001). The role of classroom assessment in teaching and learning. In V. Richardson (Ed.). *The Handbook of Research on Teaching (Fourth Edition)*. Washington D.C. American Educational Research Association.

167 Carr, M. (1997). Persistence when it's difficult: A disposition to learn for early childhood. *Early Childhood Folio*, 3, 9-12.

168 Hopkins, D. (2001). *School improvement for real*. London: Routledge.

169 Monks, F., Heller, K., Passow, A.H. (2000). Reflections on where we are and where we are going. In K. Heller, F. Monks, R. Sternberg, & R. Subotnik (Eds.). *International Handbook of giftedness and talent*. Oxford: Pergamon.

(III) Effective Links are Created Between School Cultural Contexts and Other Cultural Contexts in which Students are Socialised to Facilitate Learning.

Research-based characteristics

- Teachers ensure that student experiences of instruction have known relationships to other cultural contexts in which the students have been/are socialised.
 - Relevance is made transparent to students.
 - Cultural practices at school are made transparent and taught.
 - Ways of taking meaning from text, discourse, numbers or experience are made explicit.
 - Quality teaching recognises and builds on students' prior experiences and knowledge.
 - New information is linked to student experiences.
 - Student diversity is utilised effectively as a pedagogical resource.
- Quality teaching respects and affirms cultural identity (including gender identity) and optimises educational opportunities.
- Quality teaching effects are maximised when supported by effective school-home partnership practices focused on student learning. School-home partnerships that have shown the most positive impacts on student outcomes have student learning as their focus.
- When educators enable quality alignments in practices between teachers and parent/caregivers to support learning and skill development then student achievement can be optimised.
- Teachers can take agency in encouraging, scaffolding and enabling student-parent/caregiver dialogue around school learning.
- Quality homework can have particularly positive impacts on student learning. The effectiveness of the homework is particularly dependent upon the teacher's ability to construct, resource, scaffold and provide feedback upon appropriate homework tasks that support in-class learning for diverse students and do not unnecessarily fatigue and frustrate students.

Teachers ensure that student experiences of instruction have known relationships to other cultural contexts in which the students have been/are socialised

A commitment to equal opportunity for diverse learners means providing genuine opportunities for high-quality instruction and 'ways into' academic curricula that are consistent with language and interaction patterns of home and community (Shepard, 2001, p. 1095¹⁷⁰).

Over the past two decades there has been an increasing realisation of the central role of the cultural dimensions of classroom practice. Research on student learning has shown the importance of the match or mismatch between the social class and ethnic cultural capital of the home and the school. Because the role of culture works both through the school and the student the powerful role of culture has been rendered invisible in many of the early large scale studies of educational effects.

McNaughton (2002)¹⁷¹ explains what we have learned from the research:

170 Shepard, L.A. (2001). The role of classroom assessment in teaching and learning. In V. Richardson (Ed.), *The Handbook of Research on Teaching (Fourth Edition)*. Washington D.C. American Educational Research Association.

171 McNaughton, S. (2002) *Meeting of minds*. Wellington: Learning Media.

For some kinds of families and communities, there is already a high degree of this kind of continuity with schooling in place. In these, as it were, "spontaneously" well-matched families and schools, the knowledge and activities that are habitually part of the home life are already relatively well tuned to those activities at school; or, if you like, the school is well tuned to the activities of the home.

This is the meaning behind the idea of "cultural capital" - the term contemporary sociology uses for the storehouse of experiences, knowledge, and attitudes a child can capitalise on when going to school, given the practices of schooling (Nash, 1993)¹⁷². It is cultural capital that underlies the relationship between achievement in reading and parents' occupational status or income level. (p.21)

Brice Heath's (1982)¹⁷³ landmark study of degree of match between literacy practices at school and in communities (a mainstream middle-class community, a white mill town Appalachian community and a black mill community) illuminated the impact of the mismatches between home and schooling practices on these children.

Brice Heath (1982) found that students from the white mill community had considerable access to text and to alphabet and number books, but not to the ways of making links between texts and life experiences characteristic in middle class families. She also found that the advanced oracy skills of black students (synthesis skills highly rewarded in upper primary such as telling fictional stories to suspend reality, and use of analogical reasoning) were not recognised by mainstream junior teachers. These children's home experiences did not include the learning to label, listing features and giving what-explanations experiences characteristic of middle class and junior level school literacy practices. Brice Heath (1982) explained the kinds of strategies teachers should use to make such cultural differences transparent to children to create bridges between home and school literacy practices.

Beecher and Arthur (2001)¹⁷⁴ illustrate the importance of a teacher's ability to move beyond a limited cultural or deficit perspective on diverse family literacy practices, based on their own cultural experiences. For example, in identifying the range of literacy strengths of students from diverse communities, these Australian researchers give illustrative examples of diagnostic assessment of children's knowledge and skill:

The language practices of the McKenna family include rural Australian English (Children's learnings: understandings of, and expertise with, different ways of speaking, e.g. home dialect and play with South Park dialogue).

The McGuinness family maintains use of community Aboriginal language (Children's learnings: understandings of language, cultural identity and group membership through community Aboriginal language. Understandings of, and expertise with, the sounds, vocabulary and grammatical structures of an additional language) (p.51)

Nuthall (1999)¹⁷⁵ sees the issue of cultural match and negotiation to be so critical to classroom learning processes that he suggests 'ability' to be a consequence of cultural mismatches in students' experiences in class, rather than a cause of achievement. Nuthall (1999) reported analyses of 3217 concept files of the pre-test, post-test and interview data, and record of classroom experience relevant to each concept for 22 Pakeha, Māori and Pasifika students aged 9.6 years to 12.10 years. The analysis compared student learning experiences for content learned and content not learned. For 15 of the

172 Nash, R. (1993). *Succeeding generations: Family resources and access to education in New Zealand*. Auckland: Oxford University Press.

173 Brice Heath, S. (1982). What no bedtime story means: Synthesis skills at home and school. *Language and Society*, 11, 49-76.

174 Beecher, B., & Arthur, L. (2001). *Play and literacy in children's worlds*. Newtown: N.S.W: Primary English Teaching Association.

175 Nuthall, G. (1999). Learning how to learn: The evolution of students' minds through the social processes and culture of the classroom. *International Journal of Educational Research*, 31, 1-256.

students, long-term learning outcomes were assessed on the basis of interviews conducted a year after the science and social studies units were taught. Through detailed analysis of evidence of knowledge construction processes Nuthall explained how 'not only are the knowledge acquisition activities/processes incorporated into working memory, but so is the social and cultural context in which they take place.' (p. 189). Nuthall illustrated this process for individual students showing how different students negotiate and participate in classroom activities according to their prior knowledge, self-esteem, ability to sustain relationships and obtain information through social interaction, status and ability to trade. In short the social, cultural and cognitive are inextricably implicated in student learning.

Peer cultures and sub-cultures can provide social and material resources supporting and enabling individual students in their interaction with curriculum content, or they can function to hamper, exclude, isolate and humiliate individual students.

Nuthall (1996)¹⁷⁶ 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, Teine, 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 ... ', and 'So ... ' among Maude, Koa, Joy and Paul, that supported high achieving Joy and Paul's learning.

Nuthall explains that teachers need to work with students to establish a vocabulary and culture of shared understandings that relate to the processes of the mind as well as the tasks. On the basis of these and related analyses Nuthall (1999) concluded:

Whether a student learns or not reflects the students' understanding of classroom tasks, management of social relationships, and the extent to which the student shares the cultural understandings and background knowledge of the teacher and other students. Ability appears to be the consequence, not the cause of differences in what students learn from their classroom experiences. (p. 213)

The teacher has considerable agency in mediating links between the different contexts in which students are socialised, through inclusive pedagogy. This aspect of quality teaching is particularly significant and likely to be a key system influence on reducing disparities that persist across students from different ethnic and social class groups.

There is now a substantial, although not readily accessible, New Zealand research literature that provides evidence about this aspect of quality teaching. O'Rourke and Philips (1989)¹⁷⁷ carried out a study of process writing in practice in junior, middle primary, intermediate, Year 10 and Year 12 writing classes in Auckland, Wellington and Dunedin. They found that process-writing pedagogies tended to favour particular forms of cultural voice and to undermine the authenticity of the cultural voice of Māori and Pasifika students in the transition from oral to written language. They found that the process writing method often embedded within it the inadvertent use of a mainstream genre. They identify practices reported by teachers to be particularly effective for Pasifika and Māori students, such as drawing on ethnically diverse role models in New Zealand writing, enabling scaffolding of oral expression into written expression (rather than derivative and imitative approaches), oral sharing of work in progress, facilitating reciprocal teina/tuakana or tuakana/teina helping/learning roles, and giving mana (prestige) to the oral as well as written 'publishing' of written work. These findings are

¹⁷⁶ Nuthall, G. (1996). *What role does ability play in classroom learning?* Paper presented at the New Zealand Association for Research in Education Nelson, New Zealand.

¹⁷⁷ O'Rourke, A., & Philips, D. (1989). *Responding effectively to pupils' writing. Writing Research Report No. 2.* Wellington: Department of Education. Note: this study did not directly link processes to outcomes in the study design. However, the study included detailed observations of 72 students in 24 classes (both secondary and primary) across the North and South Islands and provides one of the most detailed accounts of classroom practices available. Given the marked disparity in student achievement results (see NEMP) in writing in New Zealand this study is of particular value.

consistent with the international evidence reviewed in the latest edition of the *Handbook of Research on Teaching* by Gersten, Baker, Pugach, Scanlon and Chard (2001)¹⁷⁸. Of particular significance is the comparability of the use of tuakana teina roles to the alternating peer use of the teacher-critic role and the reciprocal teaching model that has shown such a marked impact on higher student achievement (Palincsar & Brown, 1984)¹⁷⁹.

In contrast to the findings of Hohepa et al. (1992) in a Māori medium early childhood setting, Glynn, Atvers and O'Brien (1999)¹⁸⁰ found a low prevalence of Māori topics and themes taught across the curriculum in 10 mainstream New Zealand schools. They concluded that Māori students would have had few experiences of seeing mana Māori upheld in their day-to-day schooling.

Phillips, McNaughton and MacDonald (2001)¹⁸¹ review research showing that there needs to be a closer matching between the cultural contexts of home and school:

One way to achieve closer matching is through activities at school incorporating aspects of what has been learned before school. There are predictions that the more schools become part of their communities and incorporate community patterns of teaching, learning and language, the more effective instruction will be with 'minority' children. This is sometimes referred to as the cultural accommodation or continuity hypothesis. There is some experimental support for this position (Snow et al., 1998).

This would mean that teaching for Māori and Pacific Islands children would be more effective when classroom practices incorporate ways of teaching and learning and language uses which children bring with them to school. For example, using texts which have Māori images, topics and language (McLachland, 1996); using recitation in classroom activities building on Pacific Islands children's expertise from church and family literacy practices as an instructional strategy (McNaughton, 1999); capitalising on tuakana-teina relationships in peer tutoring to personalise instruction (Glynn, Berryman, Atvers, & Harawira, 1997); and the Māori pedagogy present in whanau-based 'Tatari, Tautoko, Tauawhi' (pause, prompt, praise). (p.22).

Mercado (2001)¹⁸² reviews a range of studies that point to the importance of teachers using reflective skills to make connections between home and school:

What teachers know about the lives of children outside of school affects their pedagogical practices. Inquiry needs to become a common pedagogical practice. In the light of the diversity that is inherent in all classrooms, having the means to construct knowledge about differences among learners may be more important and less problematic than having information on learners in pre-packaged forms' (p.690)

While teacher learning is the focus of another synthesis in progress rather than the current work, Mercado's strategy merits brief emphasis here for three reasons. First, there is evidence elsewhere in this synthesis that many New Zealand teachers bring deficit views to their understanding of cultural difference. Second, there is evidence that pre-packed forms of information about 'other cultural groups' or 'other people's children' in teacher education can contribute to stereotyped teacher views

178 Gersten, R., Baker, S., Pugach, M., Scanlon, D., & Chard, D. (2001). Contemporary research on special education teaching. In V. Richardson (Ed.). *The Handbook of Research on Teaching (Fourth Edition)*. Washington D.C. American Educational Research Association.

179 Palincsar, A.S., & Brown, A.L. (1984). Reciprocal teaching of comprehension fostering and comprehension monitoring activities. *Cognition and Instruction*, 1(2), 117-175.

180 Glynn, T., Atvers, K., & O'Brien, K. (1999). *Culturally appropriate strategies for assisting Māori students experiencing learning and behavioural difficulties*. Ministry of Education.

181 Phillips, G., McNaughton, S., & MacDonald, S. (2001). *Picking up the pace: Effective literacy interventions for accelerated progress over the transition into decile 1 schools. Final report to the Ministry of Education on the Professional Development associated with the Early Childhood Primary Links via Literacy (ECPL) Project*. Auckland: The Child Literacy Foundation and the Woolf Fisher Research Centre.

182 Mercado, C.I. (2001). The learner: "race," "ethnicity," and linguistic difference. In V. Richardson (Ed.). *The Handbook of Research on Teaching (Fourth Edition)*. Washington D.C. American Educational Research Association.

that do not result in better teaching of diverse students (Epstein, 2001¹⁸³; Lawrence, & Daniel Tatum, 1997¹⁸⁴). Third the increasing diversity of students in New Zealand schools by ethnicity, language, multiple ethnic heritages, recency of immigration, family structure and so on requires specific understandings of specific families and cultural contexts (Biddulph, Biddulph & Biddulph, 2003)¹⁸⁵. Teachers having the means and the strategies to construct knowledge about, and to be culturally responsive to learners within their everyday pedagogical practice is necessary for quality teaching (Bishop, Berryman, Richardson & Tiakiwai, work in progress¹⁸⁶).

One of the largest observational studies in a New Zealand secondary school setting emphasised the need for teachers to understand the ways in which classroom-specific culture can clash with cultural values and practices students bring to school. Jones (1991)¹⁸⁷ illustrated the ways in which cultural influences on participation can undermine the promotion of thoughtfulness and critical thinking in class, because critical thinking might be seen by students to be rude or culturally inappropriate in the class context. Jones focused on education as a cultural practice when she carried out her in-depth ethnographic studies of learning and teaching across several curricular areas. She took a role as student/researcher/participant/observer and accompanied, in class and school, 19 Pasifika girls whose parents had immigrated from Western Samoa, the Cook Islands, Tonga, Niue and Tokelau. Jones contrasted the experiences of the Pasifika 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 found the mismatch between the Pasifika 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' girls¹⁸⁸ 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 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 School Certificate 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:

183 Epstein, J.L. (2001). *School, family and community partnerships: Preparing educators and improving schools*. Boulder, Colorado; Westview Press.

184 Lawrence, S.M., & Daniel Tatum, B. (1997). Teachers in transition: The impact of antiracist professional development on classroom practice. *Teachers College Record*, 99(1), 162-178.

185 Biddulph, F., Biddulph, J., & Biddulph C. (2003). *The complexity of community and family influences on children's achievement in New Zealand: Best evidence synthesis. Report prepared for the Ministry of Education*. Wellington: Ministry of Education.

186 Bishop, R., Berryman, M., Richardson, C. & Tiakiwai, S. (Work in Progress) *Te Kotahitanga: Year 9 and 10 Professional Development Programme. Te Kauhua Professional Development Evaluation*. Māori Education Research Institute (MERI), University of Waikato, Hamilton and Poutama Pounamu Research and Development Centre, Group Special Education, Tauranga.

187 Jones, A. (1991). "At school I've got a chance": *Culture/privilege: Pacific Islands and Pakeha girls at school*. Palmerston North: Dunmore Press.

188 Designation by class grouping.

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).

Some groups of students are able to draw upon ethnic and social class cultural knowledge to manage the classroom culture in effective ways to produce high achievement. Jones contrasted the interactions between the teachers and the Pasifika 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. Jones reported a range of changes that teachers introduced after discussing the results of this research that led to more heterogeneous groupings, and some changes in classroom discourse patterns.

Gendered cultural beliefs can also present barriers to learning. For example, there is increasing research evidence that for many boys, reading is perceived as a 'girl', or feminine thing to do (Alton-Lee & Praat, 1999¹⁸⁹). The challenge for teachers is to develop a learning culture where literate masculinity is valued.

Colwell (1999)¹⁹⁰ summarised a range of research demonstrating the role the arts can take (the arts of earlier civilisations, but particularly indigenous and heritage arts) in providing students with a way of understanding and valuing their own culture and other cultures. He warns that the evidence shows superficial treatments can undermine rather than affirm cultures other than that of the dominant culture amongst students and their families. However, links to students' cultural heritages can provide a powerful pedagogical strategy across other curricula areas. It is critical that the diverse cultural resources of the students themselves are valued and linked into learning programmes at each level of schooling. Students can assist in ensuring that specific links are made when teachers use appropriate pedagogical strategies. McNeight (1998)¹⁹¹ introduced a home-school link for Samoan students within a 6th form classical studies class study of Roman religion and the Aeneid, that led to her students' achievement levels more than doubling from what they had been in previous units of work. The intervention involved students in a planned discussion with either a significant other at home or in the wider community. The focus of discussion was the associative links between what they were learning about ancient Rome and traditional Samoan culture. Each day the students would share what they had each learned as part of the lesson. McNeight reported that the effects continued after the intervention, as family members would ask the students what they were learning in classical studies. McNeight's study illustrates substantial impact of a complex link-making strategy involving a partnership between home and school and use of the peer sharing to assist in associative link making.

Teachers need to ensure that student experiences of instruction have known relationships to other cultural contexts in which the students are socialised. Because students come from many different communities and the classroom culture is in itself a new learning experience, students need the culture of the classroom made explicit to them (e.g. the meaning of handraising, what being asked for an answer, using a text or generating a product means). They need to have the relevance of their learning activities made transparent.

189 Alton-Lee, A., & Praat, A. (2000). *Explaining and addressing gender differences in the New Zealand Compulsory School Sector: A literature review*. Wellington: Ministry of Education.

190 Colwell, R. (1999). The Arts. In G. Cawelti (Ed.), *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

191 McNeight, C. (1998). "Wow! These sorts of things are similar to our culture!" *Becoming culturally inclusive within the senior secondary school curriculum*. Unpublished graduate research report., Wellington: Department of Teacher Education, Victoria University.

Associative link-making to students' prior experiences and knowledge is fundamental to the learning process and one of the recurrent and strongest findings in research on teaching. Many of the evidence-based findings referenced in the body of this synthesis (e.g. wait-time, use of diagrams, instructional dialogues) are pedagogical strategies that give diverse learners opportunities to make associative links. When academic norms are central to learning community, and teachers are able to provide the time, prompts and opportunities for diverse learners to make such links as a matter of course, then teaching is likely to be highly effective. Such approaches optimise the metacognitive gains that diverse links, and different experiences can offer, and teachers can both raise achievement and reduce disparity in achievement outcomes.

Ginsberg and Wlodkowski (2000)¹⁹² summarised evidence about the lowered motivation and disinvestment in education for many students of colour whose outcomes have not been commensurate with effort (e.g. Fordham & Ogbu, 1986¹⁹³; Tatum, 1997¹⁹⁴). Such research shows that when a dominant cultural model restricts education, such students learn to see achievement as 'acting white' and they conceal and diminish their ability to achieve. Ginsberg and Wlodkowski (2000) link the findings of this literature with those of the research on school dropouts. They hypothesise from this literature that 'as long as cultural norms, beliefs, and values differ from the dominant school norms (these students) will in large part be excluded from academic engagement and success' (p. 6). Ginsberg and Wlodkowski (2000) have drawn on the research and their hypothesis to develop a 'Motivational Framework for Culturally Responsive Teaching'. They argue that four motivational conditions are essential for developing amongst all students an intrinsic motivation for learning. The four motivational conditions of the framework are:

1. *Establishing inclusion* refers to employing principles and practices that contribute to a learning environment in which students and teachers feel respected by and connected to one another.
2. *Developing a positive attitude* refers to employing principles and practices that contribute to, through personal and cultural relevance and through choice, a favourable disposition toward learning.
3. *Enhancing meaning* refers to bringing about challenging and engaging learning. It expands and strengthens learning in ways that matter to students and have social merit.
4. *Engendering competence* refers to employing principles and practices that help students authentically identify that they are effectively learning something of value. (Ginsberg and Wlodkowski, 2000, p. 45)¹⁹⁵.

The framework is relatively new and we do not yet have strong evaluative evidence about the effectiveness of their framework. Ginsberg and Wlodkowski (2000) include evaluation tools as a key aspect of the framework. Many of the specific practices proposed within the framework link closely with evidence-based characteristics in the synthesis (e.g. structured pair reflection activities) but such an approach could also be inadvertently susceptible to the kinds of risks apparent in the learning styles approach. This framework is included in the synthesis upon the suggestion of Dr Cawelti to emphasise the need for future work in this area. It is timely because of its focus on diversity and exemplifies an attempt to ensure cultural diversity is addressed as central to issues of motivation and disaffection.

School-Home Partnerships

Research evidence shows that particularly strong and sustained gains in student achievement have been made when schools and families develop partnerships to support students' achievement at school (Walberg, 1999¹⁹⁶; Epstein, 2001¹⁹⁷).

192 Ginsberg, M.B., & Wlodkowski, R.J. (2000). *Creating highly motivating classrooms for all students: A schoolwide approach to powerful teaching with diverse learners*. California: Jossey-Bass.

193 Fordham, S., & Ogbu, J.A. (1986). Black students and school success: Coping with the burden of 'acting white', *Urban Review*, 18, 176-206.

194 Tatum, B.D. (1997). *Why are all the black kids sitting together in the cafeteria? And other conversations about race*. New York: Basic Books.

195 Ginsberg, M.B., & Wlodkowski, R.J. (2000). *Creating highly motivating classrooms for all students: A schoolwide approach to powerful teaching with diverse learners*. California: Jossey-Bass.

196 Walberg, H. (1999). Generic practices. In G. Cawelti (Ed.), *Handbook of research on improving student achievement (Second Edition)*. USA, Virginia: Educational Research Service.

197 Epstein, J.L. (2001). *School, family and community partnerships: Preparing educators and improving schools*. Boulder, Colorado: Westview Press.

The Johns Hopkins University Center on School, Family and Community Partnerships has carried out an intensive research and development programme over the past two decades focussed on effective school-home partnership approaches (Epstein, 2001¹⁹⁸). Some implications of this programme for New Zealand families and communities are considered further in Biddulph, Biddulph and Biddulph (2003)¹⁹⁹. Epstein's (2001) overview of this research programme emphasises the potential of parental involvement to have positive but also negative impacts. Epstein emphasises the agency of educators in the success of school-home partnerships. This synthesis reports findings from Epstein's research programme and emphasises the key finding about the agency of educators in developing effective school-home partnerships.

In a series of U.S studies Epstein found that teacher leadership played a major role in the extent to which parents became involved in their children's in-school learning and sustained that involvement. Epstein found teachers' deficit assumptions about families, especially single-parent families, to be a barrier to effective partnerships. Epstein also found the effects of parental involvement on school achievement to be curriculum-specific with positive effects for reading rather than for mathematics (where such practices are also much less evident than in reading).

For example, Epstein (2001) reported a longitudinal study of the impacts of teacher practices of parent involvement on the achievement of 293 third- and fifth- grade students taught by 14 different teachers in Baltimore City. Three aspects of parental involvement were significantly and positively related to student achievement in reading. These were: teacher leadership in facilitating parental involvement at home, parent resources (including parent education) and homework completion quality. Initial teacher quality (as judged by principals) and student characteristics contributed to less of the variance than these three factors. Epstein concluded:

...teachers' strong implementation of parent involvement and parents' responsive involvement with their children at home on schoolwork should increase achievement, even in families with little formal education. (p. 233)

In the light of much research showing that homework can be potentially negative unless carefully structured and managed by teachers, Epstein reported on the research-based development of the TIPS *Teachers Involve Parents in Schoolwork* process of interactive homework (Epstein, 2001). Such school-based initiatives emphasise the increasing research evidence for the critical agency of schools and teachers in developing effective school-home partnerships.

The Johns Hopkins University Center on School, Family and Community Partnerships has established a new research and development initiative called the National Network of Partnership Schools (<http://www.csos.jhu.edu/p2000>). This network ensures an ongoing action research approach to identifying what works in school-home partnerships for specific contexts. The aims of the Center are to provide a research foundation to guide schools, districts, and policymakers to create and support positive, permanent programmes of partnership, to disseminate information about what works, and to learn from a variety of approaches implemented in diverse schooling environments.

A tool emerging from the Johns Hopkins programme is a typology of six major types of involvement as shown in Table 1 (Epstein, 2001)²⁰⁰. Epstein sees all six types of involvement as important. However, as is also apparent in the available New Zealand research, unless the focus on student learning is central to the partnership, positive impacts on student achievement are smaller or do not occur.

198 Epstein *ibid*.

199 Biddulph, F., Biddulph, J., & Biddulph C. (2003). *The complexity of community and family influences on children's achievement in New Zealand: Best evidence synthesis. Report prepared for the Ministry of Education*. Wellington: Ministry of Education.

200 Epstein, J.L. (2001). *School, family and community partnerships: Preparing educators and improving schools*. Boulder, Colorado; Westview Press.

Table 1: Epstein's Framework of Six Types of Involvement for Comprehensive Programmes of Partnership

Type 1 - Parenting	Type 2 - Communicating	Type 3 - Volunteering	Type 4 - Learning at Home	Type 5 - Decision Making	Type 6 - Collaborating with the Community
Help all families to establish home environment to support children as students.	Design effective forms of school-to-home and home-to-school communications about school programs [sic] and their children's progress.	Recruit and organize parent help and support.	Provide information and ideas to families about how to help students with homework and other curriculum-related activities, decisions and planning.	Include parents in school decisions, developing parent leaders and representatives.	Identify and integrate resources and services from the community to strengthen school programs [sic] family practices, and student learning and development.

Source: Epstein (2001:409).

In the New Zealand context, Wylie, Thompson and Lythe (1999)²⁰¹ found children of parents who had no involvement in school scored less on mathematics, literacy, communication, perseverance and fine motor skills assessments. As in Epstein's (2001)²⁰² research, the strongest association with in-school achievement, after taking parental income into account in the Competent Children study findings, was in the area of reading. In their synthesis of international and U.S. research, Snow, Burns and Griffin (1998)²⁰³ also report that targeted interventions with parents around early literacy activities can be particularly effective.

School-home partnership practices that have been shown to impact on student learning outcomes have had learning as their primary focus. New Zealand's involvement of parents in boards of trustees has brought closer partnerships around administration, but the extent to which educators have forged partnerships with parents focused on student learning and achievement is the important question in the light of the research evidence. Nechyba, McEwan and Older-Aguilar (1999)²⁰⁴ conclude that even when a wide range of forms of parental involvement not directly associated with student achievement are considered, 'the best evidence is suggestive of at least a moderate positive impact of parents getting involved' (p.59). Wylie, Thompson and Lythe (1999) found also that:

The particular kind of parental involvement which seemed to make a difference for children was voluntary work at or for the school, but not being a school trustee or taking part in the parent-teacher association (p.125).

When partnerships between educators and parents are much more directly focused on student learning, the links to learning outcomes are much stronger. One of the strongest and most cost-effective examples of a partnership focused directly on the learning of low achieving students in New Zealand is evident in the dramatic and sustained outcomes in increased reading achievement reported by Biddulph (1983)²⁰⁵, Biddulph and Tuck (1983)²⁰⁶ and Biddulph (1993)²⁰⁷. Biddulph carried out a comparison of the reading progress of students whose parents received a five hour programme to assist them help their children to read, and students who did not get the parent programme but received mainstream and special assistance in school. She developed four one-and-a-quarter-hour workshops in a parent programme to assist parents to help children with reading difficulties.

201 Wylie, C., Thompson, J., & Lythe, C. (1999). *Competent children at 8: Families, early education and schools*. Wellington: New Zealand Council for Educational Research.

202 Epstein (2001) *ibid*.

203 Snow, C., Burns, M., & Griffin, P. (1998). *Preventing reading difficulties in young children*. Washington, DC: National Academy Press.

204 Nechyba, T., McEwan, P., & Older-Aguilar, D. (1999). *The impact of family and community resources on student outcomes: Strategic Research Initiative Literature Review*. Report to the Ministry of Education. Wellington: Ministry of Education.

205 Biddulph L. J. (1983). *A group programme to train parents of children with reading difficulties to tutor their children at home*. Unpublished MA research report, Education Department, University of Canterbury.

206 Biddulph, L. J., & Tuck, B. (1983). *Assisting parents to help their children with reading at home*. Paper presented to the annual NZARE conference. Wellington. See also Biddulph L. J. (1983). *A group programme to train parents of children with reading difficulties to tutor their children at home*. Unpublished MA research report, Education Department, University of Canterbury.

207 Biddulph, L. J. (1993, May). *Teacher-parent partnership to support children's reading development*. Paper presented to the New Zealand Reading Association Annual Conference, Christchurch.

For the students in Biddulph's parent programme, after only three months there were significant ($p > .001$) gains in reading achievement compared with a matched control group of students, some of whom were receiving ongoing specialist in-school assistance. In contrast with Reading Recovery, the reading gains were sustained over time. Their rate of gain over the year following the intervention was similar to that of the average reader (this occurring independently of any specialist assistance). For the control group, progress was about two-thirds that rate 'despite the fact that over half of them were receiving specialist help from their classroom teachers' (Biddulph, 1983²⁰⁸, p.12). The intervention had a positive effect also on student attitudes to reading and a reportedly positive effect on family relationships. The programme was adapted for use with parents of students with reading difficulties at junior, middle and senior primary levels, and for junior secondary students with reading difficulties. The programme has been found to be particularly effective for Pasifika and Māori parents and children. An important element in the success of this programme was the alignment of perspectives of teachers and parents in the course of the workshop programme.

The recent evaluation of the Feed the Mind campaign²⁰⁹, the nation-wide strategy designed to enable parents to take a more active role in supporting their children's numeracy and literacy development, shows it has had a major impact. Feed the Mind used television advertising, radio presentations, billboards, posters and a mail drop to encourage parents to get involved in their children's literacy and numeracy development. The groups sampled for the evaluation were predominantly of lower socio-economic status families, and Pacific²¹⁰ (36% of respondents), and Māori parents (34% of respondents).

In comparison with a benchmark study at the outset of the Feed the Mind intervention, the evaluation showed that parents' positive attitudes to helping students learn had strengthened. Student learning in literacy and numeracy was seen to be more important, barriers had weakened, knowledge of how to help had increased, and, most importantly, participation in targeted helping behaviours had increased. More than half of the sample were found to be helping their children more than they did a year or so ago, and reading was the activity they mentioned particularly. Respondents recalled the advertisements specifically, for example, numeracy tasks associated with mowing lawns (50%), painting palings (41%), counting possums (26%) and counting shoes on the marae (27%). They also cited aspects of the advertisements that had helped them to support their own children's learning, for example, counting (39%), using everyday situations to assist learning out of school (26%), and using simple and low-cost ways to support children's learning (7%), to learn while doing chores (7%) and to play games as a way of learning (6%). One of the most significant findings of the evaluation is that Pasifika parents appeared to gain confidence and change their attitudes and behaviours the most of any group in response to the Feed the Mind campaign.

Watson, Brown and Swick (1981)²¹¹ carried out a study that investigated the different effects on achievement of parents' passive support for students' in-school learning and their active support. There was a significantly marked positive relationship between active parental involvement and student achievement, to the extent that such involvement had a positive effect on student achievement irrespective of mother's education effects. These authors found that parents who were least involved in their children's learning tended to be least connected to support networks in the wider community. The implications of this finding are explored more fully in relation to the New Zealand context in Biddulph, Biddulph & Biddulph (2003)²¹².

Catsambis (1998)²¹³ reviewed research demonstrating a positive relationship between parental involvement and primary students' achievement. Then she re-analysed national U.S. data to explore

208 Biddulph L. J. (1983). *A group programme to train parents of children with reading difficulties to tutor their children at home*. Unpublished MA research report, Education Department, University of Canterbury.

209 Research Solutions (2001). *Attitudes to literacy and numeracy: 'Feed the Mind' campaign review*. Report prepared for the Ministry of Education. Wellington: Research Solutions

210 16% Samoan; 8% Tongan; 5% Cook Islands; 2% Niuean; 2% Rarotongan; 2% Fijian; 2% Tuvaluan; 1% Tokelauan

211 Watson, T., Brown, M., & Swick, K. J. (1981). The relationship of parents' support to children's school achievement. *Child Welfare*, LXII (2), 175-180.

212 Biddulph, F., Biddulph, J., & Biddulph C. (2003). *The complexity of community and family influences on children's achievement in New Zealand: Best evidence synthesis*. Report prepared for the Ministry of Education. Wellington: Ministry of Education.

213 Catsambis, S. (1998). *Expanding knowledge of parental involvement in secondary education: effects on high school academic success*. Report No. 27. Center for Research on the Education of Students Placed at Risk. Washington D.C.: U.S. Department of Education.

the relationship between parental involvement in their children's secondary education and achievement outcomes. She found particular parental practices, such as frequent communication with their 8th graders about educational matters and museum visits, to have positive long-term effects. Teachers can take agency in encouraging, scaffolding and enabling student-parent dialogue around school learning. Catambis (1998) found that indirect parental involvement, such as parent-school contacts and support of school in the middle grades, had small but lasting positive effects. Indirect family-school support such as parental volunteering at school increased parents' ability to influence their children's education during high school.

VanTassel-Baska's (2000)²¹⁴ review of research on gifted students emphasises the importance of parental involvement in their children's education, particularly for low-income or minority primary-aged gifted students. There is a substantial literature on the problems faced by teachers and parents, particularly parents of ethnic minorities, refugee children or from low socio-economic status (SES) families, in developing partnerships for learning. Humpage (1998)²¹⁵ found that for Somali refugee adolescents in Christchurch schools, the lack of parent school communication was a major obstacle to resolving a range of difficulties. Hamilton, Anderson, Frater-Mathieson, Loewen and Moore (2000)²¹⁶ reviewed Australian research on the experiences of Indo-Chinese refugees in Australia that found poor communication and exchange of information between parents and schools contributed substantially to the children's poor performance in school. Their review identified the following strategies as critical to the refugee child's success at school:

1. *the use of a mediator to work from the outset of the parent and child's involvement with the school;*
2. *the quality of the induction process used when refugee students and their parents were welcomed into the school; and*
3. *multiple meetings with parents within the first two to three months of the child's entry to school to build an effective relationship and communication with parents.*

Homework

Marzano, Pickering and Pollock (2001)²¹⁷ found homework to have the fourth largest effect size (.77) of nine instructional strategies that their meta-analysis found to be particularly influential on student learning. The results from the Programme for International Student Assessment²¹⁸ found a positive although variable relationship between amount of homework and achievement in mathematics, science and reading literacy for Year 11 students, and indicated that 'homework can be given in ways that engage socio-economically disadvantaged students' (p. 171).

Cooper's (2001)²¹⁹ review of the relationship between student participation in homework and achievement outcomes found 14 out of 20 comparisons of the 'a homework' and 'no homework' condition showed a positive effect for homework, whilst the other six showed a positive effect for no homework. It is likely that these results show marked variability in the quality of homework design and management by the teacher. The variability in this research was also directly related to student age. An average student in the high school group who participated in the homework condition would outperform 69% of students in the 'no homework' class. The effect was less strong for junior high school level and disappeared for primary students. Cooper reported cases where homework generated negative effects for students when their parents brought conflicting instructional techniques to bear on students' homework activities.

214 VanTassel-Baska, J. (2000). Theory and research on curriculum development for the gifted. In K. Heller, F. Monks, R. Sternberg, & R. Subotnik (Eds.). *International Handbook of giftedness and talent*. Oxford: Pergamon.

215 Cited in Hamilton, R., Anderson, A., Frater-Mathieson, K., Loewen, S., & Moore, D. (2000). *Literature Review: Interventions for Refugee Children in New Zealand Schools: Models, Methods and Best Practice*. Auckland: Auckland Uniservices Ltd

216 Cited in Hamilton, R., Anderson, A., Frater-Mathieson, K., Loewen, S. & Moore, D., (2000). *Literature Review: Interventions for Refugee children in New Zealand schools: Models, methods and best practice*. Auckland: Auckland Uniservices Ltd.

217 Marzano, R., Pickering, D., & Pollock, J. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Virginia: Association for Supervision and Curriculum Development.

218 OECD (2001). *Knowledge and skills for life: First results from PISA 2000*. Paris: OECD.

219 Cooper, H. (2001, April). Homework for all - in moderation. *Educational Leadership*, 34-38.

Cooper's (2001) finding regarding the effects of homework for primary students contrasts strongly with the significant increase in student reading achievement that occurred in Biddulph's (1983) study, when parents were trained to assist their children effectively with reading at home. In one New Zealand study²²⁰ where some failures to learn were specifically linked to differential homework experiences of students from homes of different socio-economic status, Diane, a low achieving Pakeha girl from a low SES family background explained that any discussion of homework in her home would appear 'smart' and inappropriate.

In the New Zealand context, Anthony and Knight (1999)²²¹ found the systematic introduction of carefully designed and monitored homework to support the learning of basic facts, particularly multiplication facts, for Years 4 and 5 students, improved student instant recall. The homework was reported also to lead to students' taking more responsibility for their learning, engender strong parental support and involvement and improve communication between teachers and parents.

Alton-Lee and Nuthall (1990)²²² found homework opportunity to be more strongly related to the learning of intermediate students than whole-class, small group or individual learning opportunities in class in social studies. In a later study of intermediate students' learning in an integrated science and social studies unit, Alton-Lee and Nuthall (1998) found curriculum-relevant homework tasks to play a critical role in enabling working memory to consolidate in-class learning before forgetting occurred.

Homework has the potential to enhance student learning, enable better retention of factual knowledge, increase understanding and support critical thinking (Cooper, 2001). Walberg's (1999)²²³ summary of the research found positive impacts of homework on achievement to be almost tripled when teachers 'take time to grade the work, make corrections and specific comments on improvements that can be made, and discuss problems and remedies with individual students or the whole class' (p.12). However, the design of the homework tasks is particularly important also. The implications of the research are that the effectiveness of homework is dependent upon the teacher's ability to construct, resource and scaffold appropriate homework tasks that support in-class learning for diverse students and do not unnecessarily fatigue and frustrate students.

Homework tasks are dependent also on a student's access to support and resources at home and, unless carefully managed, can exacerbate rather than reduce disparities in student achievement (Cooper, 2001). This pattern was evident in PISA²²⁴ but the PISA results show that teachers can manage homework design to reduce disparities. The PISA finding that homework showed a significant, although highly variable, positive relation to learning in science, mathematics and reading literacy for 15 year olds provides our most recent best evidence regarding the positive potential of homework.

In their review of effective civics (social studies) education, Torney-Purta, Hahn and Amadeo (2001)²²⁵ found a programme that involved a mock voting strategy using telephone interviews between students and their parents lessened the knowledge gap between high and low SES 5th to 12th graders. Increased communication with parents and use of political media such as newspapers at home were associated with higher knowledge levels. The effects were stronger for low SES students and their families. In summarising the research, Torney-Purta, Hahn and Amadeo found that effective civics education linked to whole-school or community-based activities influenced both students' knowledge and attitudinal outcomes.

220 Alton-Lee (1984) *ibid*.

221 Anthony, G., & Knight, G. (1999). *Teaching for understanding and memory in Year 4 and 5 mathematics*. A report prepared for the Ministry of Education. Massey University: Institute of Fundamental Sciences.

222 Alton-Lee, A., & Nuthall, G. (1990). Pupil experiences and pupil learning in the elementary classroom: An illustration of a generative methodology. *Teaching and Teacher Education*, (1), 27-45.

223 Walberg, H. (1999). Generic practices. In G. Cawelti (Ed.), *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

224 OECD (2001). *Knowledge and skills for life: First results from PISA 2000*. Paris: OECD.

225 Torney-Purta, J., Hahn, C., & Amadeo, J. (2001). Principles of subject-specific instruction in education for citizenship. In J. Brophy, (2001), (Ed), *Subject-specific instructional methods and activities. Advances in Research on Teaching*. Vol. 8. New York: Elsevier.

While parental active involvement can be a positive influence on students' in-school success across general education outcomes, for some areas of the curriculum parental involvement appears to show a stronger relationship. In health education, the research literature repeatedly shows higher effectiveness when parents and families are involved in the programme (Sawyer, 1999²²⁶; Shaw, 1994²²⁷; Summerfield, 2001²²⁸). Shaw emphasised the importance of prior consultation with parent communities, citing the example of the need to negotiate sexuality education with Pasifika community leaders well in advance of developing the programme. The involvement of parents in school programmes can have benefits for the wider family. For example, the inclusion of use of community walkways in a health and physical education programme in a New Zealand school led to families accessing for the first time, and/or making greater use of, walkways for family outings²²⁹.

In summary, the nature of parental or caregiver involvement in their children's education is crucial to improved outcomes. A key research finding is that school-home partnerships are critically dependent upon the agency of educators, their ability to avoid deficit or stereotypical characterisations of parents and caregivers, and their ability to initiate links, respond to, and recognise strengths within the diverse families of their students. Partnerships that align school and home practices and enable parents to actively support their children's in-school learning have shown some of the strongest impacts on student outcomes, especially in literacy and health and physical education. Such partnerships can provide a particularly cost-effective approach to supporting the learning of diverse students. Effective homework shows strong impacts on student achievement, particularly at secondary level. But the findings for homework are markedly variable, and even negative in some cases, reflecting to some extent varying teacher ability to construct, resource and scaffold appropriate homework tasks for diverse students.

226 Sawyer, R. (1999). Health education. In G. Cawelti (Ed.), *Handbook of research on improving student achievement (Second Edition)*. USA, Virginia: Educational Research Service.

227 Shaw, H. (1994). *Health and Physical Well-being. Literature review prepared for the Ministry of Education. Part B: Health Education*. Wellington.

228 Summerfield, L.M. (2001). School health education. In V. Richardson (Ed.), *Handbook of Research on Teaching (Fourth Edition)*. Washington D.C: American Educational Research Association.

229 Hollard, B. Milestone Report. Personal communication.

(IV) Quality Teaching is Responsive to Student Learning Processes

Research-based characteristics are specific to curriculum context and the prior knowledge and experiences of the learners.

- Teachers have knowledge of the nature of student learning processes in the curriculum area, can interpret student behaviour in the light of this knowledge and are responsive, creative and effective in facilitating learning processes.
- Examples of teaching approaches that are intended to exemplify this characteristic are the dynamic or flexible literacy models, the numeracy strategy focus and the Interactive Teaching Approach in science education.
- Classroom management enables the teacher to be responsive to diverse learners.
- Responsive teaching is important for all learners and particularly critical for students with special needs.

Quality teaching is optimised when teachers have a good understanding of, and are responsive to, the student learning processes involved. Such learning processes and sequences are, in general, specific to curriculum areas. Responsive teaching can be facilitated through one-to-one quality tutoring as has been evident in a range of tutoring evaluations including Reading Recovery (Clay, 2001²³⁰; Clay, 1998²³¹; Clay, 1994²³²; Gaffney & Askew, 1999²³³). One-to-one tutoring is a resource intensive strategy to achieve responsive teaching (Walberg, 1999)²³⁴. The challenge is to develop our evidence base to inform responsive teaching for whole classes. We also need to develop our understandings about, and strategies for, complex pedagogical practices that enable teaching to be responsive to multiple and diverse learners. In New Zealand, classroom research programmes on learning and teaching in science, reading, social studies and mathematics have emphasised teacher responsiveness to student learning processes; these are reported below.

The strongest evidence we have for a national improvement in student learning outcomes has arisen out of professional development programmes designed to enable teachers to be responsive to student learning processes in literacy and numeracy. Thomas and Ward's (2001)²³⁵ evaluation of the *Count Me In Too* professional development programme with 563 New Zealand teachers found teacher understanding of student learning processes in number to be critical to the significant increases in achievement across the sample of 9309 students. The study is particularly significant in our best evidence synthesis because it is one of the few New Zealand studies to trace increases in student achievement linked to professional development and teaching practice across a broad national sample of students. The study included students from Auckland, Waikato, central North Island, Wellington, Nelson, Canterbury, Otago and Southland.

Thomas and Ward outline the research-based Learning Framework for Number used in the pilot project, which identifies developmental progressions in five aspects of early arithmetic knowledge. These five aspects relate to a child's:

- *level of sophistication in counting and in other strategies to solve relatively simple addition and subtraction problems*
- *facility with forward number word sequences*
- *facility with backward number word sequences*
- *ability to identify numerals, and*
- *understanding of tens and ones (p.7).*

230 Clay, M. (2001). *Change over time in children's literacy development*. Auckland: Heinemann.

231 Clay, M. (1998). *By different paths to common outcomes*. York, Maine: Stenhouse Publishers. (see particularly page 213).

232 Clay, M. (1994). *Reading recovery: The wider implications of an educational innovation*. *Literacy, teaching and learning* 1(1), 121-194. Reprinted from A.Watson and A. Badenhop (eds.). (1992). *Prevention of reading failure*. London: Ashton Scholastic.

233 Gaffney, J. & Askew, B., (Eds.). (1999). *Stirring the waters: The influence of Marie Clay*. Portsmouth: Heinemann.

234 Walberg, H. (1999). Generic practices. In G. Cawelti (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

235 Thomas, G., & Ward, J. (2001). *An evaluation of the Count Me In Too Pilot*. Report prepared for the Ministry of Education. Wellington: Ministry of Education.

Thomas and Ward's conclusion shows how critical the educator's knowledge is in supporting effective teaching:

Teachers' subject matter and pedagogical knowledge are critical factors in the teaching of mathematics for understanding. The effective teacher of mathematics has a thorough and deep understanding of the subject matter to be taught, how students are likely to learn it, and the difficulties and misunderstandings they are likely to encounter. (p.51).

The findings of the early numeracy intervention have been borne out in the exploratory research and development work with New Zealand teachers at the middle primary level. Higgins (2001)²³⁶, in her evaluation of the Years 4 to 6 Numeracy Exploratory study, found that a diagnostic interview strategy provided teachers with a more detailed knowledge of student thinking. That strategy changed teacher approaches and led to responsive pedagogical practices. The teachers' focus changed from emphasis on teaching mathematical knowledge to using mathematical knowledge to underpin teaching of strategies to assist learners.

This New Zealand research is congruent with the conclusion of an international synthesis of research on quality mathematics teaching²³⁷ that 'student achievement and understanding are significantly improved when teachers are aware of how students construct knowledge' (p.19). In his review of research on effective geometry teaching, Battista (2001)²³⁸ concluded that the key principle underpinning effectiveness is that 'instruction must focus on developing students' understanding and supporting their personal sense making.' (p.180).

Responsive Pedagogies

As its name suggests, the *Interactive Teaching Approach* was a research-based pedagogical strategy designed to enable teachers to teach in a way that is responsive to student learning processes (Biddulph & Osborne, 1984)²³⁹. The *Interactive Teaching Approach* was developed out of the Learning in Science Project (Primary). The Learning in Science Project was a sustained research programme focussed on problems in the learning and teaching of science that extended across primary and secondary science teaching (see, for example, Tasker, Freyberg & Osborne, 1982²⁴⁰; Kirkwood & Carr, 1988²⁴¹; Wittrock, 1986²⁴²). A substantial series of studies followed in which New Zealand students' understandings about scientific concepts (e.g. floating and sinking, animals, energy) were explored in order to assist teachers to be responsive to students' prior understandings.

The focus of the approach was developing children's metacognitive and critical thinking skills along with their knowledge of the world. Biddulph and Osborne (1984) explained that the approach enables the teacher 'to become more sensitive to children's ideas and questions' and develops the teacher's ability to be responsive to children:

To develop the skill of interacting with the children to challenge, modify, and extend their ideas instead of leaving it to the children to make of the experiences what they will, or dogmatically imposing on them answers to their questions' (p. 6).

The interactive teaching approach involved five stages in the teaching process:

236 Higgins, J. (2001). *An Evaluation of the Year 4 – 6 Numeracy Exploratory Study*. Wellington: Learning Media.

237 Grouws, D.A., & Cebulla, K. J. (1999). *Improving student achievement in mathematics. Educational Practice Series-4*. Lausanne: Unesco, International Academy of Education.

238 Battista, M. (2001). A research-based perspective on teaching school geometry. In J. Brophy, (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8*. New York: Elsevier..

239 Biddulph, F., & Osborne, R. (Eds.).(1984). *Making sense of our world: an interactive teaching approach handbook. Working Paper No. 122*. Science Education Research Unit. Hamilton: University of Waikato.

240 Tasker, R., Freyberg, P., Osborne, R. (1982). *Final Report: Learning in Science Project (Forms 1-4)*. Hamilton: University of Waikato.

241 Kirkwood, V., & Carr, M. (1988). *Final Report: Learning in Science Project (Energy)*. University of Waikato.

242 Wittrock, M. (1986). Students thought processes. In M. Wittrock (Ed.). *Handbook of Research on Teaching (Third Edition)*. New York: MacMillan.

- (1) *Preparation* (giving teachers an overview, providing background to the topic and assembling resources),
- (2) *Exploration* (clarifying the topic and carrying out exploratory activity),
- (3) *Children's Questions* (assisting the children to generate their own questions about a topic, engaging them with other children's questions, and selecting agreed questions for investigation),
- (4) *Specific Investigations* (planning and conducting investigations and seeking the views of experts), and
- (5) *Reflection* (reporting on findings and evaluating the process and the learning).

At each stage of this responsive teaching approach, the model included explicit strategies for attending to diversity. For example, during the preparation stage, the teacher and students participated in the pooling and sharing of resources enabling resource access across the class. Biddulph (1989)²⁴³ emphasised the importance of all students having their questions considered:

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).

The interactive teaching approach explicitly attended to both the social and cognitive aspects of the teaching-learning process. Foreshadowing later research on the role of learning community, Biddulph and Osborne (1984) emphasised the need for teachers to build care and respect amongst students to enable children to feel safe enough to share their emergent ideas:

It also requires that the teacher help the children separate their ideas from themselves so that the questioning of ideas is no longer felt by the children to be a threat to self-worth. (p.9).

Dalzell (1986)²⁴⁴ was one of 48 teachers who used an action research approach to implementing the interactive teaching approach at different age levels in primary schools (Biddulph, 1989). Dalzell found the interactive teaching approach to be a profound challenge and reported the struggles she had using the approach, for example, in confronting the shortcomings of her own scientific knowledge, changing her teaching approach to enable her to listen to the children's ideas, and effectively managing the chaos that threatened as she maximised children's access to resources.

Dalzell(1986) also reported a range of evidence of change for students that reflected deeper learning for more diverse students, particularly low achievers. She gained greater understanding of, and was able to utilise as a resource, the children's prior knowledge and experiences. Dalzell (1986) witnessed students taking more responsibility for their learning and developing the capability to monitor their own knowledge. She also saw changes in the peer culture that assisted students' metacognitive strategies and confidence in other curriculum areas.

Dalzell's article is just one example of hundreds of mostly unpublished action research studies carried out by New Zealand teachers and trainee teachers using the interactive teaching approach in science, mathematics and social studies. What is notable about Dalzell's account is both the teacher-reported evidence of children's development of self-regulatory, critical thinking, metacognitive and collaborative skills, and the honesty of reflection about the genuine and ongoing challenge of organising teaching to be responsive to student's learning processes.

243 Biddulph, F. (1989). *Children's questions: their place in primary education*. Unpublished doctoral dissertation. Hamilton: University of Waikato.

244 Dalzell, D. (1986). *Interactive teaching: On first using the approach*. SET Research Information for Teachers, No 2. Wellington: NZCER

Another pedagogical approach designed to enable responsive teaching was also developed out of the Learning in Science Project. The 'generative learning' model was designed for Year 7-10 students (Cosgrove & Osborne, 1985)²⁴⁵. It consists of:

1. *A preliminary phase (teacher preparation phase in which teachers (a) ascertain the typical ideas that children bring to a topic and the prevalence of these ideas in their class and (b) understand the ideas that scientists use to explain the phenomena).*
2. *A focus phase which provides a series of tasks that enable the children to clarify their own views about the phenomena.*
3. *A challenge phase which has them testing the validity of their view (by seeking evidence) and comparing their views with the view of scientists.*
4. *An application phase which requires pupils to engage with problems, which can be most simply, and elegantly solved using the accepted scientific view.*

The generative approach was illustrated with an account of action research undertaken by Cosgrove and Osborne (1985) on the topic of electric current with intermediate school children (11-year-olds). Pre- and post-test results of two classes of children (N=29 and N=15) were compared with the responses of a representative sample of 302 children. The children in the generative learning classes showed significant shifts in their ideas about electrical current in a circuit.

There has been much research on the developmental process of early reading. The principle that instructional practice should be responsive to students' learning process has been increasingly evident in research on effective teaching of literacy^{246 247 248 249}.

Perhaps more than any other curriculum area, research on literacy has identified the contextual diversity and socio-cultural complexity of developmental processes. Teachers not only need to be able to recognise the developmental progressions of emergent literacy and early reading (such as the development of alphabetic knowledge, phonological knowledge and comprehension), but also the kinds of literacy practices that the child has engaged in at home and how these interface with literacy practices in the classroom.

Phillips, McNaughton and MacDonald (2001)²⁵⁰ report interventions in early childhood and junior school settings in decile 1 schools in Otara and Mangere that enabled the achievement of predominantly (up to 90%) Māori and Pasifika students to be the equivalent of that expected of a capable six-year-old student anywhere in New Zealand. Their review of research linked to high achievement emphasised the principle of “dynamic” or “adaptable” instruction, where the teacher is able to use diagnostic information to be responsive to the literacy learning of the student.

Phillips, McNaughton and MacDonald use the frame of developmental profiles and distinguish 'inside out skills' and 'outside in skills'. 'Inside out skills' enable readers to decode print into sound and sound into language. 'Outside in skills' include conceptual knowledge, event knowledge, scripts, and knowledge of synthesis and expository text structure and concepts about the meaning of print. Phillips, McNaughton and MacDonald emphasise 'knowing children well through systematic observation and using personalised instruction and rich texts in the context of flexible and adaptable

245 Cosgrove, M. & Osborne, R. (1985). Lesson frameworks for changing children's ideas. In R. Osborne & P. Freyberg (Eds.), *Learning In Science: The implications of children's science*. Auckland: Heinemann.

246 Hoffman, J. & Duffy, G. (2001). Beginning reading instruction. In J. Brophy, (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8*. New York: Elsevier.

247 Phillips, G., McNaughton, S., & MacDonald, S. (2001). *Picking up the pace: Effective literacy interventions for accelerated progress over the transition into decile 1 schools. Final report to the Ministry of Education on the Professional Development associated with the Early Childhood Primary Links via Literacy (ECPL) Project*. Auckland: The Child Literacy Foundation and the Woolf Fisher Research Centre.

248 Phillips, G., & Smith, P. (1999). A third chance to learn. *SET, 1* (11).

249 Darling-Hammond, L. (1998). Teachers and teaching: Testing policy hypotheses from a National Commission report. *Educational Researcher, 27* (1), 5-15.

250 Phillips, G., & Smith, P. (1999). A third chance to learn. *SET 1* (11).

instruction' (p.20). Hoffman and Duffy (2001)²⁵¹ emphasise that reading only progresses if children understand that they are seeking meaning, and that reading and writing are message-sending and message-receiving processes that are carried out for important purposes.

Phillips, McNaughton and MacDonald (2001) warn that knowing predictors of achievement in literacy teaching will not necessarily lead to best practice. Unless the teacher is able to be responsive to the child's developmental needs and strengths, then the instruction may not be responsive to what that child needs at that time. Rather, teachers need to create opportunities for children to learn through joint activity or the co-construction of meaning through classroom tasks.

The need for teachers to be knowledgeable about and responsive to student learning processes is critical to student knowledge development in social studies and science. Drawing on a series of six studies of Years 4 to 8 student experiences in class linked to short- and long-term learning outcomes, Alton-Lee and Nuthall (1998)²⁵² described the knowledge generation process of students as moving through five stages:

- *obtaining information*
- *creating associative links*
- *elaborating content*
- *evaluating the consistency, coherence and verifiability of information, and*
- *achieving metacognitive awareness of one's own new knowledge.*

Alton-Lee and Nuthall pointed out that the range of effective pedagogical strategies teachers create and use can be infinite in variety, as long as they are responsively matched to the student's learning processes. Teachers need to provide pedagogical sequences and sets of tasks that mirror the unconscious knowledge acquisition processes of students. The challenge for teachers is to provide sufficiently rich pedagogical opportunities for diverse students to learn when they are each at different stages of the learning process for any particular concept. Phillips, McNaughton and MacDonald (2001) address this issue in the context of effective literacy teaching for diverse students:

Successful teachers of children with diverse social, linguistic and cultural identities in the United States commonly emphasise the breadth of their teaching strategies and their efforts to involve all children in the classroom, however they can (Dyson, 1999; Ladson-Billings, 1994). What this means is that different instructional activities and forms of guidance are employed, not as a recipe but as an integrated whole, and these are changed and adjusted to suit individual needs. (p. 17).

Alton-Lee and Nuthall (1998)²⁵³ provided a framework illustrating the importance of the match between pedagogical approaches and the student's learning process, for example, the use of student questions, brainstorms and dialogue to identify what students don't know, and the use of demonstrations, field experiences and informants to assist students to obtain information. Amongst other approaches, they identified the use of diagrammatic and visual representations and class discussion as assisting students to make associative links that would activate the schematic representations in their memories. They emphasised the importance of the involvement of students in making their own visual, textual, oral and enacted representations to elaborate content. Of particular importance was the teacher's ability to create an evaluative climate that gives priority to critical thinking. An example given was teacher modelling of critical thinking through the question>answer>evaluation cycle in class discussion. Also important to this stage of the learning cycle was opportunity for student-check routines, and opportunities for peer interaction, argument and

251 Hoffman, J. & Duffy, G. (2001). Beginning reading instruction. In J. Brophy, (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8.* New York: Elsevier.

252 Alton-Lee, A., & Nuthall, G. (1998). *Inclusive instructional design: Theoretical principles emerging from the Understanding Learning and Teaching Project.* Report to the Ministry of Education. Wellington: Ministry of Education.

253 Alton-Lee, A., & Nuthall, G. (1998). *Ibid.*

debate. Structured reflection in tasks or dialogue, particularly reflection on assessment, were examples of tasks that supported the final stage of knowledge generation.

One of the key findings from Nuthall and Alton-Lee's (1993)²⁵⁴ analyses of student experiences of curriculum was that the timing of instruction should be responsive to the constraints of student working memory span. If students experienced more than a day between one opportunity to interact with a new idea and a subsequent opportunity to interact with the new idea, then forgetting occurred and instructional opportunity was wasted. For learning to occur, teachers must ensure that students have sufficiently frequent and paced opportunities to interact with new content before they lose their emerging understandings from working memory and forget.

When a student has three to five opportunities to interact with a new idea within a time period that enables previous information to be related to new information, then learning can occur. Alton-Lee and Nuthall (1998) conclude that:

To optimise learning opportunities for all students the organisation and time-tabling of instructional units should ensure dense and recurrent access to relevant topic content through inter-linked classroom activities to support the developmental sequence of construct generation. (p.17).

Alton-Lee and Nuthall (1998) found that when teachers do not design their instructional programme to be responsive to the constraints of memory and knowledge generation, then high achieving students can compensate to some extent through additional opportunities to learn at home, and greater reading and knowledge access proficiency. Low achieving students, and in particular students from homes with lower cultural capital match to that of the school, fail to learn.

Teacher understanding of the learning process is critical for enabling teachers to understand the range of difficulties that low achievers may be encountering that inhibit knowledge construction. Examples of barriers to the learning cycle evident across Understanding Learning and Teaching Project studies were:

- fewer direct experiences of the wider environment (e.g. through lack of access to family car);
- less access to resources, reference books, library visits, museums, additional tuition;
- poorer literacy skills inhibiting access to information in science and social studies;
- less school-relevant prior knowledge available to support links to new learning;
- less access to verbal interaction about curriculum-relevant concepts at home;
- less access to information from highly resourced peers for social isolates, or students with low status within the peer group; and
- lower ownership of, and ability to borrow, pens, erasers, paper and other learning materials^{255 256}.

Teachers and schools can do much to counter such barriers to the learning cycle. For example, teachers can ensure enriched access to relevant experiences, demonstrations and texts, including electronic access in class. Teachers can use listening posts to give students access to both oral and written versions of source texts. Teachers can make linkages between curriculum content and more diverse experiences of learners; and structure and intensify opportunities for peer dialogue about the curriculum content. And it is critical for schools to ensure that access to physical resources such as

254 Nuthall, G. A., & Alton-Lee, A. G. (1993). Predicting learning from student experience of teaching: A theory of student knowledge construction in classrooms. *American Educational Research Journal*, 30 (4), 799-840.

255 Alton-Lee, A. (1984). *Understanding learning and teaching: An investigation of pupil experience of content in relation to immediate and long-term learning*. University of Canterbury.

256 Alton-Lee, A., & Nuthall, G. (1998). *Inclusive instructional design: Theoretical principles emerging from the Understanding Learning and Teaching Project*. Report to the Ministry of Education. Wellington.

pens, erasers and ICT is enabled. Teachers can also develop strategies to enable parents to provide complementary experiences at home.

McNaughton (1999)²⁵⁷ identified diversity awareness as a way to draw upon the different resources that diverse learners might be bringing to the classroom in order to optimise teacher responsiveness to students in literacy:

Diversity awareness refers to the degree to which a teacher is aware of how much he or she knows about individual children's expertise in literacy, including family and community-based forms and functions. (p. 12)

Responsiveness to Students with Special Needs

In reviewing research on effective provision to support the learning of students with special needs, Moore, Timperley, Macfarlane, Brown, Thomson and Anderson (1998)²⁵⁸ highlight research showing the critical role of diagnostic analysis of the child's learning needs in context. They cite Ysseldyke and Christenson's (1993) TIESII assessment procedure designed to identify the degree of match between student behaviour, student learning needs and instructional environment:

This involves analysis of such components as: instructional match, teacher expectation, classroom environment, instructional presentation, cognitive emphasis in instruction, motivational strategies, the provision of relevant practice, informed feedback, adaptive instruction, progress evaluation and student understanding. (p.4).

Diagnosis plays a key role in responsive teaching, particularly for students with special needs. Walberg (1999)²⁵⁹ identifies 'adaptive education' as an umbrella term for a variety of instructional techniques that use integrated cyclical diagnostic and prescriptive approaches to responsive teaching. Walberg summarised research showing positive impacts of adaptive instructional programmes on achievement. The key elements of adaptive education are that it is systematic, focuses on the individual's needs, identifies and addresses barriers to learning, and involves planning to achieve an integrated and ongoing responsive education programme. When specialist knowledge is needed to assist the teacher to understand the learner's needs (for example, in the case of students with disabilities) the approach enables the teacher to inform and co-ordinate their efforts with the diagnostic expertise and knowledge of specialists. Evidence suggests that a critical part of the success of such adaptive education approaches is the learner's access to well-structured peer and social interaction opportunities (Fisher & Meyer, in press²⁶⁰; Hocutt, 1996²⁶¹; Wang & Baker, 1985-1986²⁶²).

Responsiveness to All Students

In the United States, evaluations show success of some district-wide initiatives that have been developed in an attempt to support teachers in higher levels of responsiveness to students. Structured approaches to responsive teaching have been developed in order to improve student achievement in mathematics and literacy, particularly for economically disadvantaged and African-American students, across whole U.S. school districts. For example, Cawelti and Protheroe (2002)²⁶³ reported substantial district-wide reductions in achievement gaps coupled with increased achievement for even the highest achieving students in the Brazosport Independent School District in Texas. A model called

257 McNaughton, S. (1999). Developmental diversity and beginning literacy instruction at school. In J. Gaffney, & B. Askew, B. (Eds.). (1999). *Stirring the waters: The influence of Marie Clay*. Portsmouth: Heinemann.

258 Moore, D., Timperley, H., Macfarlane, A., Brown, D., Thomson, C. & Anderson, A. (1998). *Literature review: Effective provision and resourcing for special needs relating to behaviour and learning. Prepared for SE2000 Project Research Manager, Ministry of Education. Auckland Uniservices Ltd. Wellington: Ministry of Education.*

259 Walberg, H. (1999). Generic practices. In G. Cawelti (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

260 Fisher, M., & Meyer, L.H. (in press). Development and social competence after two years for students enrolled in inclusive and self-contained educational programs. *Research and Practice for Persons with Severe Disabilities*.

261 Hocutt, A.M. (1996). Effectiveness of special education: Is placement the critical factor? *Special Education for Students with Disabilities*, 6(1), 77-102.

262 Wang, M.C., & Baker, E.T. (1985-86). Mainstreaming programs: Design features and effects. *The Journal of Special Education*, 19(4), 503-521.

263 Cawelti, G., & Protheroe, N. (2002). *High student achievement: How six school districts changed into high performance systems*. Presentation to the New Zealand Ministry of Education, July 2002.

the 8 Step Instructional Process was developed to ensure teacher attention to individual student's progress up to the mastery stage:

1. Disaggregate data [By district, campus, subject, grade level, classroom and student]
2. Develop timeline of skills, topics to be taught [By campus, subject and grade level]
3. Deliver instructional focus [By grade level and by subject]
4. Administer assessment [By grade level, by subject, by student]
5. If no mastery - Tutorial
6. If mastery -Enrichment
7. Provide ongoing maintenance [For all students, entire school year]
8. Monitoring [By district, campus, teacher]

Key aspects of the process are that the pedagogical approach is dependent upon the assessment results of individual students and individual tutorials are systematically used to ensure responsive teaching to students within the larger programme.

Many mastery learning approaches have used a responsive teaching approach to ensure higher achievement for all students rather than just a small proportion. Walberg (1999)²⁶⁴ found that more than 50 studies 'show that the careful sequencing, monitoring, and control of the learning process raises the learning rate' (p.18). As signalled elsewhere in this review the variance in the effect sizes associated with these interventions has sometimes distinguished approaches that are more responsive to students and do not isolate individual learners. Rather the more effective approaches support learning through structured opportunities for direct instruction and dialogue with peers and the teacher (Walberg, 1999; Colwell, 1999²⁶⁵).

Responsiveness in All Curricula Areas

Coherent subject-specific pedagogical models and adaptive education approaches can provide useful organising frameworks for teachers and students to facilitate responsive teaching. There appears to be less systematic evidence available about the use of specific pedagogical models in other curricula areas (for example, social studies) than in science, reading and mathematics. Recent evidence has shown positive achievement outcomes from the use of the jurisprudential teaching model in social studies in the United States (Shaver, 1999²⁶⁶). Jurisprudential teaching involves students in in-depth consideration of specific cases of public policy issues and issues of personal citizenship behaviour. The model uses an analytic framework that requires students to acknowledge different frames of reference, clarify language, determine relevant factual information, identify and evaluate values, and make decisions that take into account uncertainty. Key aspects of the model are the valuing of difference and conflict, and an intensive dialogic approach. Shaver (1999) reports evidence for enhanced student interest, more frequent use of analytic concepts, better historical knowledge, and more interest in other issues that had not been studied when jurisprudential teaching approaches were used.

Our strongest evidence of the potential for higher achievement for diverse students arises out of a range of classroom research and development programmes that make student learning processes and understandings transparent, and make explicit the kinds of teaching practices and approaches that support student learning processes. What is notable about these responsive teaching approaches is that they bring together into coherent pedagogies many of the characteristics of quality teaching identified across the international research. In cases where there has been specific provision of professional development in such approaches in New Zealand, with associated monitoring of student learning, there has been evidence of marked improvement in student outcomes.

264 Walberg, H. (1999). Generic practices. In G. Cawelti (Ed.), *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

265 Colwell, R. (1999). The Arts. In G. Cawelti (Ed.), *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

266 Shaver, J. P. (1999). Social Studies. In G. Cawelti (Ed.), *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

(V) Opportunity to Learn is Effective and Sufficient

Research-based characteristics

- Quality teaching provides sufficient and effective opportunity to learn.
- Management practices facilitate learning (rather than emphasising compliant behaviour or control).
- Curriculum enactment has coherence, interconnectedness and links are made to real life relevance.
- Quality teaching includes and optimises the effective use of non-linguistic representations by teacher and students. (This assumes the concurrent and rich use of oral language and text as central to literacy across the curriculum.)
- Curriculum content addresses diversity appropriately and effectively.
- Students have opportunities to resolve cognitive conflict.
- Students have sufficient and appropriate opportunities for practice and application.

Quality teaching provides sufficient and effective opportunity to learn

Brophy (2001) reports a relationship between opportunity to learn and achievement across the curriculum. Quantity of instruction, or 'opportunity to learn' has been recognised as a critical variable in influencing student learning outcomes for 40 years (Carroll, 1963²⁶⁷; Bloom, 1974²⁶⁸; Haertel, Walberg & Weinstein, 1983²⁶⁹). In a recent review Walberg (1999)²⁷⁰ reported that there are now more than 130 studies showing a link between time and learning, with the strongest impacts evident when students are engaged in '*aligned time on task*' (p. 13).

Instructional quantity is ranked as the variable with the fourth highest effect size (.84) in Hattie's (1999)²⁷¹ summary of the variables that show an above average influence on learning. It appears the relationship is particularly strong in mathematics. Grouws and Cebulla (1999)²⁷² conclude: 'The extent of the students' opportunity to learn mathematics content bears directly and decisively on student mathematics achievement' (p.10).

In the New Zealand context Alton-Lee (1984)²⁷³ found opportunity to learn to be strongly positively related to learning in terms of total opportunity, spread of opportunity to support links within working memory, and number of opportunities to ensure that long-term remembering occurs. It is noteworthy that this strong relationship was evident in a classroom where the pre- and post-test data showed substantial learning to be occurring. Length of opportunity to interact with relevant curriculum content was strongly and consistently ($r=0.72$) related to learning for high, medium and low achieving Pakeha nine-year-olds in a Christchurch science unit. However, the relationship was strongest ($r= 0.96$) for the case study student from a low SES home. Unlike the other students who reported further opportunities to learn from home experiences and conversations, she appeared to be far more dependent upon in-school opportunity to learn. These findings about opportunity to learn were replicated in a further series of studies with Pakeha, Māori and Samoan learners although the actual amount of time spent varied according to curriculum topic and age of students.

In tracing the links between student engagement in tasks and learning outcomes, Alton-Lee and Nuthall (1990)²⁷⁴ found that opportunity to learn occurred when three variables interacted: opportunity

267 Carroll, J.B. (1963). A model of school learning. *Teachers College Record*, 64, 723-733.

268 Bloom, B.S. (1974). Time and learning. *American Psychologist*, 29: 682-688.

269 Haertel, G., Walberg, H., Weinstein, T. (1983). Psychological models of educational performance. *Review of Educational Research*, 53, 75-91.

270 Walberg, H. (1999). Generic practices. In G. Cawelti (Ed.), *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

271 Hattie, J. (April, 1999). *Influences on student learning*. Inaugural lecture, University of Auckland, New Zealand

272 Grouws, D.A., & Cebulla, K. J. (1999). *Improving student achievement in mathematics. Educational Practice Series-4*. Lausanne: Unesco, International Academy of Education.

273 Alton-Lee, A. (1984). Understanding learning and teaching: An investigation of pupil experience of content in relation to immediate and long-term learning. University of Canterbury, Christchurch: Unpublished doctoral thesis. See also Alton-Lee, A., & Nuthall, G. (1990). Pupil experiences and pupil learning in the elementary classroom: An illustration of a generative methodology. *Teaching and Teacher Education: An International Journal of Research and Studies*, 6(1), 27-46.

274 Alton-Lee, A., & Nuthall, G. (1990). Pupil experiences and pupil learning in the elementary classroom: An illustration of a generative methodology. *Teaching and Teacher Education: An International Journal of Research and Studies*, 6(1), 27-45.

to interact with curriculum content, student behaviour, and resource access. Opportunity to learn was only effective if the student had the resources to exploit that opportunity. For example, the relationship between length of opportunity to learn and long term learning was confounded when pupils did not have relevant concrete experience of concepts taught in class. Learning occurred more quickly when students had opportunities to identify and resolve discrepancies between their current understandings and new information. When such opportunities did not occur, no matter how much time was spent, the case study students either did not learn or appeared to learn in short-term tests but were found to have reverted to their prior beliefs when tested and interviewed a year later. The findings from this local study are consistent with research on teaching in other countries. For example, in her summary of evidence about strategies to improve student achievement in science, Gabel (1999)²⁷⁵ identified the provision of discrepant events in science as one of twelve teaching strategies most likely to raise student science achievement:

Using discrepant events in science instruction results in cognitive conflict that enhances students' conceptual understanding and students' attitudes towards critical thinking activities. (p. 169)

Opportunity to learn can be particularly critical where the outcomes sought include social outcomes and/or behavioural changes. For example, sustained learning time has been found to be particularly critical for effective health programmes. Shaw (1994)²⁷⁶ cited Bremberg's (1991)²⁷⁷ review which found that medium effects on general health practices require classroom programmes of more than 30 hours per year. Bremberg found that, within the context of this kind of sustained programme, a 5 to 10 hour unit aimed at confirming non-smoking and inoculating students against pressures to smoke can succeed, particularly if boosted by additional sessions and parental participation. Sufficient programme time has also been identified as critical to the effectiveness of health education by Summerfield (2001)²⁷⁸ in her review of evaluations of health education in the fourth edition of the *Handbook of Research on Teaching*.

In this synthesis we focus on evidence of the characteristics of classroom experience and pedagogical design that optimise opportunity to learn. The findings from many studies that have systematically investigated the links between classroom processes and student outcomes indicate that 'opportunity to learn' is not well understood. Nuthall (2001)²⁷⁹ points out that there is a problem in practice and in the research literature in the 'enshrinement of the busy active classroom as the model of effective teaching' (p.225). He notes that classroom management procedures, learning activities and performance assessment of teachers are sometimes based on this model, but it is an invalid index of quality teaching if 'quality teaching' is defined in relation to student outcomes.

275 Gabel, D. (1999). Science. In G. Cawelti (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

276 Shaw, H. (1994). *Health and Physical Well-being. Literature review prepared for the Ministry of Education. Part B: Health Education*. Wellington.

277 Bremberg, S. (1991). Does school health education affect the health of students? A literature review. In D. Nutbeam, B. Haglund, P. Farley, & P. Tilgren (Eds.). *Youth health promotion: From theory to practice*. London: Forbes, 89-107.

278 Summerfield, L.M. (2001). School health education. In V. Richardson. (Ed.). *Handbook of Research on Teaching (Fourth Edition)*. Washington D.C: American Educational research Association.

279 Nuthall, G. (2001). Understanding how classroom experience shapes students' minds. *Unterrichts Wissenschaft Zeitschrift für Lernforschung*, 3, 224-267.

Management Practices Facilitate Learning (Rather than Emphasising Compliant Behaviour or Control).

In a landmark video study of the impact of different disciplinary practices on students, Kounin (1970)²⁸⁰ found many teacher disciplinary practices (in particular desists for misbehaviour) to interrupt, interfere with, and undermine learning processes and, in the case of younger children, distress the students. Kounin developed a technical language to describe teacher strategies such as 'withitness', 'dangles', 'overdwelling' and 'fragmentation' to illustrate management practices that optimised instructional flow, and student engagement with curriculum. He emphasised the importance of the teacher's pedagogical strength (for example, in ensuring variety, challenge, and instructional flow) in minimising student misbehaviour.

In his synthesis of research, Brophy (2001)²⁸¹ concludes that students learn more when most of the available time is allocated to curriculum-related activities, and the classroom management system emphasises maintaining students' engagement in those tasks. Brophy describes this as a shift of emphasis from disciplinary approaches to classroom management, to management for learning:

A major determinant of students' learning in any academic domain is their degree of exposure to the domain at school through participation in lessons and learning activities. The length of the school day and the school year create upper limits on these opportunities to learn. Within these limits, the learning opportunities actually experienced by students depend on how much of the available time they spend participating in lessons and learning activities. Effective teachers allocate most of the available time to activities designed to accomplish instructional goals.

Research indicates that teachers who approach management as a process of establishing an effective learning environment tend to be more successful than teachers who emphasize their roles as disciplinarians. Effective teachers do not need to spend much time responding to behaviour problems because they use management techniques that elicit student co-operation and engagement in activities and thus minimise the frequency of such problems. (p7).

New Zealand classroom research linked to student outcomes has shown evidence of classroom management and disciplinary practices actively inhibiting student learning, particularly for low achievers. Alton-Lee and Nuthall (1992)²⁸² analysed the opportunity to learn of 26 students selected to provide a range of case studies by achievement level, ethnicity and socio-economic status in six New Zealand South Island Year 5 to Year 8 classes over 108,435 quarter- or half-minutes sorted according to characteristics of different opportunities. The sorted files of classroom experience were analysed by learning outcome and behaviours and opportunities strongly related to different learning outcomes (where rates per hour were used in the analysis to control for the overall relationship between time and learning). Alton-Lee and Nuthall found many behaviours traditionally classified in research studies as 'on task' to be unrelated or inconsistently or even negatively related to learning outcomes (e.g. writing). In contrast, many behaviours traditionally classified as 'off task' were positively related to learning outcomes. For example, there was a strong and positive relationship between 'moving' and long-term learning outcomes from concepts encountered during group tasks. In that Year 5 class, the positive outcome was related to the way in which student movement was facilitating immediate resource access (whether teacher, peer or reference material). Getting information in a timely way supported the learning process, and minimised time spent in confusion or time wasted waiting for the teacher to come and assist. Interestingly, such effective movement occurred despite the teacher's instruction for students to stay seated.

280 Kounin, J.S. (1970). *Discipline and group management in classrooms*. New York: Holt, Rinehart & Winston.

281 Brophy, J. (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8*. New York: Elsevier.

282 Alton-Lee, A. & Nuthall, G. (1992). Students' learning in classrooms: Curricular, instructional and socio-cultural processes influencing student interaction with curriculum content. Invited address for the symposium 'The analytic study of learning and interaction in classrooms: International perspectives.' Annual meeting of the American Educational Research Association, San Francisco.

Alton-Lee and Nuthall found many 'on task' behaviours of low achievers, in particular, were not facilitative of learning. These included colouring in, providing page frames, drawing headings, and sitting quietly as asked rather than interrupting the teacher and clarifying difficulties as high achievers were observed to do. The teacher played a key role in maintaining unproductive engaged behaviour from low achievers. 'On task' behaviour that was not facilitative of learning was often focused on matters emphasised in teacher instructions.

Curriculum enactment has coherence, interconnectedness and links are made to real life relevance.

Brophy (2001)²⁸³ summarises the research findings in this area as follows:

Research indicates that networks of connected knowledge structured around powerful ideas can be learned with understanding and retained in forms that make them accessible for application. In contrast, disconnected bits of information are likely to be learned only through low-level processes such as rote memorizing, and most of these bits either are soon forgotten or are retained in ways that limit their accessibility. Similarly, skills are likely to be learned and used effectively if taught as strategies adapted to particular purposes and situations, with attention to when and how to apply them, but students may not be able to integrate and use skills that are learned only by rote and practised only in isolation from the rest of the curriculum (Beck & McKeown, 1988²⁸⁴; Good & Brophy, 2000²⁸⁵; Rosenshine, 1968²⁸⁶). (p.11).

Content sequencing can be a critical element of pedagogical design. Ennis' (1999)²⁸⁷ review of research on improving achievement in physical education emphasises the issue of content sequencing to ensure new knowledge and skill development is built on a strong foundation.

Gabel (1999)²⁸⁸ also concluded that there is strong research support for the use of real-life situations to assist students to learn, and to make transparent meaningful connections between classroom learning and real-life applications. Evidence about outcomes includes increases in student interest as well as achievement and enhanced problem-solving skills. Gabel's summary includes reference to evidence about the effectiveness of carefully structured and integrated use of films, videotapes, videodiscs and CD Roms in using real-life situations.

Non-Linguistic Representations

The research is providing increasingly strong evidence of a key role for diagrams, pictures and other non-linguistic representations in illuminating curriculum content, and influencing the achievement of diverse learners. Marzano, Pickering and Pollock (2001)²⁸⁹ found student engagement in non-linguistic representations to have the fifth largest effect size (0.75) of the nine key instructional strategies that showed the strongest influence on student achievement. Non-linguistic representations enable students to make representations of their understandings and the connections between these. This instructional strategy is particularly significant because of its effectiveness with ESOL students²⁹⁰. Examples used in the research reviewed by Marzano, Pickering and Pollock include descriptive pattern organisers, time sequence patterns, process/cause-effect pattern organisers, generalisation/principle pattern organisers, concept pattern organisers, process/cause-effect patterns for negotiation, student pictographs, physical models, and mime and physical movement as

283 Brophy, J. (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching*. Vol. 8. New York: Elsevier.

284 Beck, I. & McKeown, M. (1988). Towards meaningful accounts in history texts for young learners. *Educational Researcher*, 17(6), 31-39.

285 Good, T., & Brophy, J. (2000). *Looking in classrooms. (8th edition)*. New York: Addison Wesley Longman.

286 Rosenshine, B. (1968). To explain: A review of the research. *Educational Leadership*, 26, 275-280.

287 Ennis, C.D. (1999). Physical education. G. Cawelti (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

288 Gabel, D. (1999). Science. In G. Cawelti (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

289 Marzano, R., Pickering, D., & Pollock, J. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Virginia: Association for Supervision and Curriculum Development.

290 Gallas, K. (1998). Art as epistemology: Enabling children to know what they know. In E. Mintz and J. Yun (Eds.). *The complex world of teaching: Perspectives from theory and practice*.

Harvard Educational Review Reprint Series, 31, 293-304.

representation. The teacher's role in guiding this representational work by students was critical to their success.

Creative drama and theatre can enable students to make and experience representations of processes and ideas across the curriculum. Colwell (1999)²⁹¹ reported that:

Research results vary in impact and power, but over 70% of studies in this area show that student learning can be improved significantly through creative drama as students assume roles and interact in improvisation or in role playing. (p. 31).

In a summary of research linked to outcomes, Colwell (1999)²⁹² reported that the evidence reveals the action dimension of creative drama to facilitate learning for students. Creative drama is more effective than either oral interpretation or creative writing approaches alone. A key strength of the use of creative drama is the range of outcomes this approach can facilitate. For example, research has found that creative drama can result in improved attitudes to school, particularly for at-risk youth; increased cognitive gains, more personal meaning for students, creativity, and leadership strengths. However, there are risks when the use of creative drama with other curricular areas is not sufficiently supported by other learning experiences to support curricula goals. In the New Zealand context Alton-Lee (1984)²⁹³ found the opportunity to act out a concept to be variably related to learning outcomes in science. In cases where a Pakeha student did not have relevant prior experience or opportunity to attend to a relevant concrete experience within the class programme, the process of creative drama did not compensate for the lack of initial links to experience. In other cases the child's experience of acting out a concept appeared to play an important role in embedding and extending new learning. Accordingly, the research suggests a potentially powerful role for creative drama across the curriculum, when creative drama is integrated effectively with other pedagogies and sequenced appropriately.

Curriculum Content Addresses Diversity

The research on the wider issue of content coherence is complex and subject-dependent. There is also a substantial research literature that documents the way the structuring of content in the traditional curriculum can influence student learning through making visible the perspectives and knowledges of some groups and not others (e.g. Apple & Weiss, 1983)²⁹⁴. This research raises the question of what opportunity to learn might mean for some students whose ethnicity, cultural background, sexual orientation or gender is excluded, undermined or diminished within the curriculum. There is New Zealand evidence of student alienation from curriculum content that is experienced as excluding by ethnicity or cultural perspective²⁹⁵. There has been a substantial literature investigating the impact of the gendered nature of curriculum content on the learning and well-being of girls and boys (see Alton-Lee & Praat, 2000).²⁹⁶ This research literature in particular identifies the role curriculum can play in supporting a culture of peer bullying. The message is clear that the classroom culture, student well-being, and learning outcomes, particularly for diverse students, are influenced by the nature of curriculum content.

However, the challenge for quality teaching is to develop curriculum content that links to the diversity of students' heritages while ensuring critical thinking. Britzman (1995)²⁹⁷ warned that politically correct additive responses to addressing diversity are not pedagogically effective:

291 Colwell, R. (1999). The Arts. In G. Cawelti (Ed.), *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

292 Colwell, R. (1999). The Arts. In G. Cawelti (Ed.), *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

293 Alton-Lee, A. (1984). *Understanding learning and teaching: An investigation of pupil experience of content in relation to immediate and long-term learning*. University of Canterbury, Christchurch: Unpublished doctoral thesis.

294 Apple, M., & Weiss, L. (Eds.). (1983). *Ideology and practice in schooling*. Philadelphia: Temple University Press.

295 Alton-Lee, A.G., Densem, P. A., & Nuthall, G.A. (1991). Imperatives of classroom research: Understanding what children learn about gender and race. In J. Morss & T. Linzey (Eds.), *Growing up: Lifespan development and the politics of human learning*. Auckland: Longman Paul.

296 Alton-Lee, A., & Praat, A. (2000). *Explaining and addressing gender differences in the New Zealand Compulsory School Sector: A literature review*. Wellington: Ministry of Education.

297 Britzman, D. (1995). Is there a queer pedagogy? Or, stop reading straight. *Educational Theory*, 45(2), 151-165.

In this way the problem of curriculum becomes one of proliferating identifications, not closing them down... But ...more is required than simply a plea to add marginalized voices to an already overpopulated site. (p. 158).

New Zealand teachers Tania McBride and Mike Greenslade^{298 299} focussed on resource structure and critical thinking to better represent the diversity of experience in Antarctic work, than would have been the case using the school's traditional male-focussed curricula. They brought into the class a scientist and field leader of an Antarctic expedition (who was female). They also provided multiple factual accounts of the work and accomplishments of women of different ethnicities and nationalities in Antarctica to supplement and challenge the existing school resources - in particular the collection of media stories about the 'first woman in Antarctica' - all of different women. An analysis of the existing texts revealed different kinds of discourses about the presence or not of women in Antarctica: male-only /implicit; male norm/female exception; 'ungendered' and multiple positionings. Through providing the students with substantial factual information about the work of diverse women in Antarctica these teachers developed the students' ability to critically evaluate the information they encountered. Student learning outcomes were linked to curriculum experiences where critical thinking was enabled. For example:

- students experienced disjunctions between the different discourses, (for example, the information about many different women's involvement in Antarctic exploration and work countered the male only/implicit structure of many texts)³⁰⁰
- teachers taught and modelled and students used an evidence-check procedure (*'If Nevin's auntie went then not just men have been down to Antarctica'*)

The teachers provided complex information about individuals that challenged simple stereotypes (deconstructed unitary identity) and represented multiple positionings for workers in Antarctica (mother, scientist, wimp, hero, and animal lover). An important outcome of this pedagogical strategy is that many of the students, both boys and girls, were enabled to see themselves taking diverse roles (e.g. as scientists, geologists, workers, companions) in Antarctica rather than excluding themselves on the basis of 'learning' stereotypical archetypes associated with Antarctica work or working in a harsh environment.

A New Zealand teacher of Year 6 students in social studies carried out an action research study of her own teaching about World War Two. By involving students in interviewing their grandparents or older people in their communities about their experiences, the class community was able to bring together a collaborative book representing the experiences of Māori, Pakeha, Samoan, Japanese, German, and British women to supplement the particular view of history available in the curriculum materials (Vincent, 1992)³⁰¹. Her approach supported sustained critical thinking for Year 6 students, brought about marked changes in the students' understandings about World War Two, and enabled the diverse cultural traditions of the students in her class to be included in the curriculum content.

Students have Opportunities to Resolve Cognitive Conflict

A key issue in the evidence about student learning that recurs throughout this synthesis is that students need to be able to resolve cognitive conflicts that arise when their existing ideas conflict with their new learning. If such opportunity to resolve conflicts does not occur then the time needed for students to work through their ideas can be much greater, or students may appear to learn, then forget or fail to learn (Alton-Lee & Nuthall, 1990³⁰², Nuthall & Alton-Lee, 1990³⁰³). When teachers are sensitised to,

298 Alton-Lee, A.G. with McBride, T., Greenslade, M. and Nuthall, G. (1997). *Gendered discourses in social studies: intermediate students' learning and participation during studies of antarctic work and survival focused on women*. Report to the Ministry of Education. Understanding Learning and Teaching Project 3. Wellington: Ministry of Education.

299 McBride, T. (1997). *Planning, preparing and teaching gender-inclusive curriculum: evaluation and implications from a teacher's perspective*. Report to the Ministry of Education: Understanding Learning and Teaching Project 3.

300 An example of the 'discrepant event' strategy identified as a key learning strategy in Gabel's (1999) review considered elsewhere in this synthesis.

301 Vincent, K. (1992). *Development and evaluation of a woman-focussed task*. Unpublished assignment for a stage 3 education course: EDUD 323: Classroom learning processes: University of Canterbury.

302 Alton-Lee, A.G., & Nuthall, G.A. (1990). Pupil experiences and pupil learning in the elementary classroom: An illustration of a generative methodology. *Teaching and Teacher Education: An International Journal of Research and Studies*, 6 (1), 27-46.

303 Nuthall, G. A., & Alton-Lee, A. G. (1990). Research on teaching and learning: Thirty years of change. *Elementary School Journal*. 90(5), 547-570.

and responsive to the nature and strength of students' existing views, then they can design tasks and interaction opportunities to effectively challenge students' ideas and lessen the learning time markedly.

Students have Sufficient and Appropriate Opportunities for Practice and Application

The research reported above shows how a teacher enabled students to apply their knowledge and skills (e.g. interviewing) to enrich and enable their learning in the course of a social studies unit. Practice and application opportunities have also been found to be effective in supporting learning across the curriculum, although the ways in which such opportunity is optimised through practice opportunities tend to be curriculum-specific.

Practice has been found to be particularly critical to the effectiveness of physical education instruction when practice opportunity is sufficient, at the right level of difficulty and carried out by each student with mental concentration (Ennis³⁰⁴). In a videotaped comparison of teacher behaviours associated with student gains in gymnastics, Behets (1997)³⁰⁵ found significantly higher student gains occurred when teachers provided more active learning time and significantly less instruction. Silverman (1990)³⁰⁶ found a curvilinear relationship between student practice opportunities and competency in middle school students' development of volleyball skills. Appropriate practice of a forearm pass was positively related to achievement, although after many practice trials a plateau was reached. Inappropriate practice was found to be negatively related to achievement in volleyball and swimming.

Ennis (1999)³⁰⁷ concludes that appropriate opportunities for students to engage in vigorous physical activity and motor skill development during school time and intervals (recesses) not only contribute to the achievement of physical education goals but also to the achievement of academic goals across the curriculum.

Practice opportunities are critical to the development of strong literacy skills in one's first language (Squire, 1999)³⁰⁸. Practice opportunities, particularly opportunities for practice through meaningful interaction, are particularly important when students are learning languages other than their first language (Met, 1999)³⁰⁹.

Laney (2001)³¹⁰ reviewed research showing links to student outcomes for effective pedagogical strategies using application in economics (also an aspect of New Zealand social studies from Years 1 to 10). Laney identified a series of programmes using experience-based instruction where children from K-6 grapple with a real life social and economic problem within their own classroom society. In general, the students are confronted with a scarcity problem such as seating at a learning centre. They brainstorm possible solutions, discuss costs and benefits of each, and make and implement a decision about the management of the resource. Students create classroom currencies and are required to deal with social and economic dimensions of the problem. Teacher debriefing plays a critical role. Principles that underpin this kind of instruction include active participation, real-life experiences, and learning through bearing the consequences of their decisions.

Grouws and Cebulla (1999)³¹¹ conclude from their overview of research that students can learn both concepts and skills by solving mathematical problems. They conclude that the evidence reveals problem solving opportunities to enable students to learn new skills and concepts:

Research suggests that it is not necessary for teachers to focus first on skills development then move on to problem solving. Both can be done together.

304 Ennis, C.D.(1999). Physical education. In G. Cawelti (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

305 Behets, D. (1997). Comparison of more and less effective teaching behaviours in secondary physical education. *Teaching and Teacher Education*, 13 (2), 215-224.

306 Silverman, S. (1990). Practice and achievement. *Teaching and Teacher Education*, 6(4), 305-314.

307 Ennis, C.D.(1999). *Ibid.*

308 Squire, J.R. (1999). Language arts. In G. Cawelti (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

309 Met, M. (1999). Foreign language. In G. Cawelti (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

310 Laney, J.D. (2001). Enhancing economic education through improved teaching methods: Common sense made easy. In J. Brophy, (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching*. Vol. 8. New York: Elsevier.

311 Grouws, D.A., & Cebulla, K. J. (1999). *Improving student achievement in mathematics. Educational Practice Series-4*. Lausanne: Unesco, International Academy of Education.

Skills can be developed on an as-needed basis, or their development can be supplemented through the use of technology. In fact, there is evidence that if students are initially drilled too much on isolated skills, they have a harder time making sense of them later. (p.16).

A study in Tauranga Year 4 classes investigated the impact of the use of spreadsheets on numeracy development (Calder, 2002)³¹². The findings showed student use of spreadsheets to have improved their knowledge of number, and the level of strategy they used for addition and subtraction, relative to the progress of a control class who did not use spreadsheets. The researcher hypothesised that the visual diagrammatic aspect of the spreadsheet was significant in improving achievement. Also the speed of processing increased student motivation and willingness to take risks.

The National Council of Teachers of Mathematics in the U.S. has produced a series of standards documents that exemplify curricular standards with research-based vignettes of effective practice demonstrating a problem-solving focus. Recent analyses of state achievement data in the U.S. show significant achievement gains to be linked to the introduction of these curricula documents, associated professional development and follow-on changes in classroom practices (Swanson & Stevenson, 2002)³¹³. Stein (2001)³¹⁴ reviewed a range of studies providing evidence that the move to a problem solving approach in mathematics teaching in the U.S. has been associated with 'increases in student performance on assessment tasks that measure students' capacity to think, reason and communicate' (p. 112). ERO (2001)³¹⁵ noted the best New Zealand classrooms have more emphasis on problem solving in mathematics (p.16).

Application activities have been found to be particularly important in science as discussed earlier in this synthesis, and in social studies. Torney-Purta, Hahn and Amadeo (2001)³¹⁶ reviewed research on effective instruction in education for citizenship (an aspect of New Zealand social studies). Recent analyses of the U.S. National Assessment of Educational Progress found that programmes that had involved students in mock elections, governmental or legal bodies, or mock trials were effective in promoting achievement, in contrast with programmes emphasising memorisation, drill, or frequent tests and quizzes, which were seen to be counterproductive for learning.

Particularly strong impacts on students are evident in a range of research about out-of-school applications, authentic activities and outdoor education and adventure programmes. Hattie, Marsh, Neill and Richards (1997)³¹⁷ reported a meta-analysis that found the effects of adventure programmes to be significant in positively influencing student independence, confidence, self-efficacy, self-understanding, assertiveness, and internal locus of control. Rubie (1999)³¹⁸ found a Māori culture group experience not only to lead to a significantly positive mean gain in self-esteem (+10 points) on the Coopersmith Inventory, but also to a change that was significant over time (at the $p < .01$ level.) for Year 3 to 6 students. The Māori culture group comprised students from a decile 2 school and two control groups were included in the study, drawing on students who were closely matched for achievement, age and ethnicity from the same school (decile 2) and a nearby West Auckland decile 4 school. Students from the same school who were not part of the group showed a slight decline in self-esteem (-0.49 points) while the control group from the other school showed a slight but not sustained rise over time (3.56 points on the Coopersmith). The experience was also associated with gains in academic achievement and locus of control for the culture group.

312 Calder, N. (2002). *Can the use of spreadsheets enhance the development of numeracy?* Unpublished Masters of Education thesis. Hamilton: University of Waikato.

313 Swanson, C.B., & Stevenson, L. D. (2002). Standards-based reform in practice: Evidence on state policy and classroom instruction from the NAEP state assessments. *Educational Evaluation and Policy Analysis*, 24(1), 1-27.

314 Stein, M.K. (2001). Teaching and learning mathematics: How instruction can foster the knowing and understanding of number. In J. Brophy, (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8.* New York: Elsevier.

315 Education Review Office (2001). *ERO Reviews. Future Directions: Analysis of responses.* <http://www.ero.govt.nz/whatsnew/index.htm>

316 Torney-Purta, J., Hahn, C., & Amadeo, J. (2001). Principles of subject-specific instruction in education for citizenship. In J. Brophy, (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8.* New York: Elsevier.

317 Hattie, J., Marsh, H., Neill, J., & and Richards G. (1997). Adventure education and outward bound: Out-of-class experiences that make a lasting difference. *Review of Educational Research*, 67 (1), 43-87.

318 Rubie, C. (1999). *The effect of a Māori Culture Group experience on children's self-esteem, locus of control and academic performance.* University of Auckland: Unpublished MEd thesis.

The Māori culture group experience was an intensive, high quality educational programme that required intensive time in training, expertise from the wider community, involvement of parents, high standards and extensive overseas travel. The training resulted in a performance in Gallipoli and a televised performance at the International Children's Festival in Ankara, Turkey, in April 1998. Interviews with caregivers and teachers revealed that development in a range of educational skills and social skills occurred in the context of this experience. For example:

'She's more tolerant. She knows when to walk away and she doesn't get herself into strife with other people'. (p. 65).

'She'll go and try something now whereas before she would only do things she knew she would succeed at. Now she'll have a go anyway. (p 66)

'He definitely tends to take more responsibility..'(p. 66)

'She seems happier and she's prepared to take the lead a lot more, which she wouldn't do before (p. 67).

Rubie (1999) concluded that there had been advances in social maturity:

'Behavioural changes that indicated improved self-esteem included that the children were more self-disciplined, more organised, more responsible, more reliable, were more willing to try new things, were happier and were now more proud of their heritage.' (p. 73).

In summary, there is a long research history demonstrating that time is necessary for learning to occur. However, outcomes-linked research indicates that what appears to be opportunity to learn may be unproductive busy work in classrooms. Classroom management practices focused on discipline, compliance, presentation of work and quiet engagement may actually counter the kinds of opportunities that facilitate sustained learning. The evidence suggests that teachers need to marshal classroom management practices to support learning. Productive opportunity to learn is constrained by the nature of students' memory and learning processes. Teachers need to design tasks to challenge students' misconceptions and structure opportunities to enable cognitive conflict resolution. Teachers can optimise learning opportunities for diverse students by complementing language use with multiple opportunities for students to have access to, generate and use non-linguistic representations such as diagrams. For opportunity to learn to be sufficient to facilitate long-term learning students need curriculum-appropriate opportunities to practice and apply their new learning. Opportunities for authentic applications through links to real-life contexts in or out-of-school can have significant and sustained impacts on student knowledge, attitudes, self-esteem, independence and confidence.

(VI) Multiple Task Contexts Support Learning Cycles

Research-based characteristics

- Task cycles match developmental learning cycles of students.
- Task cycles enable students to engage in and complete learning processes so that what is learned is remembered.
- Optimal use is made of complementary combinations of teacher-directed groupings, co-operative groups, structured peer interaction and individual work (including homework) to facilitate learning cycles.

Research on task contexts suggests students are most likely to learn and remember new information when they have the opportunity to engage with new information across multiple task contexts, including tasks that enable co-operative learning in small groups or pairs.

This characteristic of quality teaching has been undermined historically both by policy initiatives and research approaches that have seen a particular task context as providing a magic bullet for higher student outcomes. Various movements or dictums have emphasised particular task contexts – sometimes to the exclusion of others. Whole class teaching was seen to be an answer for higher standards in Britain during the 1990s by one of Her Majesty's Chief Inspectors. Individualised instruction was seen to be a logical answer to improved outcomes when learning was assumed by some to be entirely dependent upon the interaction between teacher and learner, and the impact and potential of the peer culture was less acknowledged. Co-operative group work has sometimes been championed as an alternative to other task contexts because of the strong evidence of higher achievement outcomes. Well-managed co-operative group work, with student training and effective task design can provide one of the most effective learning contexts. But it is a mistake to focus on just one kind of learning context. Meloth (1997)³¹⁹, whose research combining metacognitive strategy teaching and cooperative group work showed particularly high achievement impacts (e.g. Meloth & Deering, 1994)³²⁰, once remarked that despite the power of cooperative group work, if a teacher knew that a class of children would need to escape quickly from a fire that afternoon, the teacher would use whole group teacher-directed instructions and would not use a co-operative group task to get the message across! Cooperative group tasks can be most effective when supported by individual preparation and effective teacher-directed guidance.

One concern raised in the New Zealand educational research literature has been ethnic stereotyping associated with particular task contexts. Hohepa, McNaughton and Jenkins (1996)³²¹ questioned the notion that co-operative group learning contexts are necessarily ethnically preferable to any other learning contexts for Māori students. They found multiparty group exchanges to comprise just under half of the contexts in which Māori students in Kōhanga Reo engaged. However, dyadic interactions that effectively scaffolded student learning, dyadic peer and child-adult tuakana/teina (shifting junior and senior learning-teaching roles) interactions, and personalised interactions, were also integral to the participation and learning of these students. Hohepa, McNaughton and Jenkins's (1996) findings are well-supported by the wider international research literature about the value of dyadic learning, one-to-one interactions and the interdependence of different task contexts.

Another caution about task context arises out of the findings for individualised instruction in schooling. Lipsey and Wilson's (1993)³²² overview of meta-analytic findings revealed the effect sizes for individualised and programmed instruction to be very low and even negative (when compared with traditional methods), for science and mathematics learning. While the idea that a learner would be following a self-paced, individualised modular course of learning appeared to have much promise, the isolation of the learner from social contexts and teacher-led dialogic discussion appears to have lessened student achievement. Although some individualised programmes, especially those designed for older learners, showed stronger effect sizes (0.28 - 0.35), this level of effect size does not meet the

319 Meloth, M. (1995). Recent research on co-operative learning pedagogies. Invited address to Faculty of Education, Victoria University of Wellington/ Wellington College of Education.

320 Meloth, M., & Deering, P. (1994). Task talk and task awareness under different co-operative learning conditions. *American Educational Research Journal*, 31(1), 138-165.

321 Hohepa, M., McNaughton, S., & Jenkins, K. (1996). Māori pedagogies and the role of the individual. *New Zealand Journal of Educational Studies*, 31(1), 29-40.

322 Lipsey, M. W., & Wilson, D.B. (1993). The efficacy of psychological, educational, and behavioral treatment: Confirmation from meta-analysis. *American Psychologist*, 48 (12), 1181-1209.

.40 level some consider to be a minimum level for effectiveness compared with traditional practice. Sustained individualised task contexts do not appear to have been nearly as effective learning contexts as those offered by well-designed co-operative group work, reinforcing the importance of the social and interactive nature of learning.

As has been apparent in the evidence reported in this synthesis already, skilled teachers use multiple and complex combinations and sequences of task contexts to support learners.

Interdependencies in Whole Class, Group and Individual Tasks Contexts

An international review of task context use in mathematics education has found that whole-class discussion following individual or group work improves student achievement. Individual or pair grouping work can give students the opportunity to scaffold their own learning through preparing, reflecting on, and/or practising a task before risking public participation. Whole class discussion enables key ideas from individual or group work to be brought to the surface (Grouws & Cebulla, 1999)³²³. Conceptual confusion and conflict made evident through whole class discussion can have a key role to play in student learning when well managed by the teacher. Grouws and Cebulla review research suggesting that effective whole class discussion becomes a collaborative problem solving effort. They emphasise that this context offers effective instructional opportunities that do not occur in small group or individual settings. However, Grouws and Cebulla (1999)³²⁴ found that co-operative group contexts were, in turn, most effective when they built on preliminary individual work done by students.

In the New Zealand context Alton-Lee (1984)³²⁵ compared the strength of relationship to learning outcomes of a range of task contexts (whole class, group and individual) and learning opportunities³²⁶. Of the seven opportunities and behaviours that were most strongly and consistently related to the long-term learning of Year 4 students, Alton-Lee (1984) found two to be whole class opportunities, three to be peer group learning opportunities and two to have occurred in individual task work. She found over 80% of content learned and remembered by Year 5 students studying science occurred in multiple task contexts, and almost half of the time they spent engaged with the content occurred in teacher-directed whole class or group contexts. Nuthall and Alton-Lee (1990)³²⁷ found that older students in Year 7 were able to learn and remember more content they encountered only in teacher-directed contexts (almost half of unit time). While there was variability in the mix of task contexts that facilitated learning across the programmes of a range of teachers, the sequence of whole class lessons followed by effective group and/or individual task opportunities tended to facilitate learning in these curricular areas.

An important finding was that the whole class learning opportunities were the most strongly and consistently related to long-term learning for high, average and low achievers. These were: attending to a concrete demonstration organised by the teacher within the whole class; and attending to teacher-pupil discussion. With the exception of teacher talk associated with instructional diagrams, whole class lesson time that featured only teacher talk showed a negative relation to student learning for Year 5 students. By contrast, whole class discussion including teacher-pupil discussion was not only facilitative of student learning; but also it appeared to be particularly facilitative of the learning of diverse students, including low-achieving students (Alton-Lee & Nuthall, 1998)³²⁸.

Classroom research has shown that whole class discussion, as a verbal medium, can enable potentially greater access to curriculum content for students than written text. While individual tasks enable students to develop literacy skills, particularly reading for meaning and writing, in the context of

323 Grouws, D.A., & Cebulla, K. J. (1999). *Improving student achievement in mathematics. Educational Practice Series-4*. Lausanne: Unesco, International Academy of Education.

324 Grouws, D.A., & Cebulla, K. J. (1999). *Ibid.*

325 Alton-Lee, A. (1984). *Understanding learning and teaching: An investigation of pupil experience of content in relation to immediate and long-term learning*. University of Canterbury, Christchurch: Unpublished doctoral thesis.

326 Alton-Lee, A.G., & Nuthall, G.A. (1990). Pupil experiences and pupil learning in the elementary classroom: An illustration of a generative methodology. *Teaching and Teacher Education: An International Journal of Research and Studies*, 6 (1), 27-46.

327 Nuthall, G. A., & Alton-Lee, A. G. (1990). Research on teaching and learning: Thirty years of change. *Elementary School Journal*, 90(5), 547-570.

328 Alton-Lee, A., & Nuthall, G. (1998). *Inclusive instructional design: Theoretical principles emerging from the Understanding Learning and Teaching Project*. Report to the Ministry of Education. Wellington: Ministry of Education.

interacting with curriculum ideas there is a cost to some students whose level of literacy is relatively low for key textual material. When students first encounter new vocabulary in the oral context of class discussion, they are more likely to be able to interpret and make sense of that vocabulary in the context of individual tasks. Whole class discussion also enables a discussion cycle wherein new ideas are linked publicly to students' prior experiences and knowledge. The use of a peer translator during whole class discussion supported the learning of new immigrant Japanese students in a South Island Year 7 intermediate class, as did the incorporation of the use of visual images through slides and pictures into class lessons (Alton-Lee et al., 1997)³²⁹.

Co-operative Task Contexts

Brophy (2001)³³⁰ particularly emphasised the wide range of research demonstrating evidence of the positive effects of co-operative group learning opportunities on student outcomes. An important finding is that when teachers are effective in structuring group membership and tasks, and in training students in collaborative skills, the evidence shows positive gains in academic, social and attitudinal outcomes (for example, Vaughan, 2002³³¹). Further, there is evidence of long-term and residual effects of effective training in cooperative group and interpersonal skill behaviours (Gillies, 2002)³³².

There is a strong body of international evidence about the particular effectiveness of well-designed co-operative group tasks in supporting student learning. For example, Slavin's (1990)³³³ review of 99 studies of co-operative learning across primary and secondary schools concluded that co-operative group methods were effective in improving student achievement in mathematics, particularly when the task design emphasised group goals and individual student accountability. There were positive effects on cross-ethnic relations and student attitudes towards school. In their review of meta-analytic findings, Lipsey and Wilson (1993)³³⁴ reported effect sizes for achievement effects of co-operative group approaches varied from .16 to .75. This range shows the potential of co-operative group work to vary considerably. However, for three of the meta-analyses, including consideration of over 300 studies, the effect sizes were 0.62, 0.72 and 0.75 showing particularly strong effects on achievement of effective co-operative group work.

Cohen's (1986)³³⁵ carefully constructed co-operative tasks in science and mathematics are bilingual. These tasks are designed by groups of experts including cultural, scientific and pedagogical experts, and the students are trained to use rigorous procedures for group engagement. Provisions are made to support the many languages of students in Californian classes in the management of the classroom practices, even though the teacher cannot speak many of the students' languages. These tasks have been found to produce particularly large gains in achievement in mainstream classes.

Alton-Lee (1984) found peer interactions during the negotiation and organisation of group tasks to be one of the seven behaviours and opportunities across all task contexts that showed a strong and consistent relationship with long-term learning for Year 4 Christchurch students in science. Attending to peer activity during group work was also one of the seven key behaviours in this category. During this process arguments were frequent, and Alton-Lee hypothesised that the impact of peer arguments on cognitive restructuring was particularly powerful. Conflict over ideas apparently motivated and enabled students to resolve cognitive conflict.

Nuthall (1997)³³⁶ reviewed diverse studies that have 'identified the apparently privileged role that peer interactions play in changing students' cognitive structures' (p.692). Nuthall's synthesis suggests that students expect teachers to have different views, but find the different beliefs of their peers a personal

329 Alton-Lee, A.G. with McBride, T., Greenslade, M. & Nuthall, G. (1997). *Gendered discourses in social studies: intermediate students' learning and participation during studies of Antarctic work and survival focused on women*. Report to the Ministry of Education. Understanding Learning and Teaching Project 3. Wellington: Ministry of Education.

330 Brophy, J. (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8*. New York: Elsevier.

331 Vaughan, W. (2002). Effects of co-operative learning on achievement and attitude among students of colour. *The Journal of Educational Research*, 25 (6), 359-364

332 Gillies, R. M. (2002). The residual effects of co-operative learning experiences: A two-year follow-up. *The Journal of Educational Research*, 96(1), 15-20.

333 Slavin, R. E. (1990). *Co-operative learning: Theory, research and practice*. Englewood Cliffs, NJ: Prentice-Hall.

334 Lipsey, M. W., & Wilson, D.B. (1993). The efficacy of psychological, educational, and behavioral treatment: Confirmation from meta-analysis. *American Psychologist*, 48 (12), 1181-1209.

335 Cohen, E. (1986). *Designing groupwork*. New York: Teachers College Press.

336 Nuthall, G.A. (1997). Understanding student thinking and learning in the classroom. In B. Biddle, T. Good & I. Goodson (Eds.). *International handbook of teachers and teaching. Vol. 2*. 681-768.

and significant challenge. Hence, the social context motivates, and is inextricably implicated in, the cognitive change. Nuthall cites Blaye's (1990)³³⁷ finding that students made most progress in solving binary matrix problems when they were required to reach agreement. Several researchers have concluded that students need a set of co-operative principles that enable the productive resolution of arguments.

Inder and Todd (1993)³³⁸ reported two studies in Otago used to encourage cognitive progress through the use of conflict and resolution. Problem solving software was used with a co-operative group context to facilitate student learning about ecosystems. These researchers and teachers found that verbal and physical assertion occurred rather than genuine engagement with cognitive conflict. Too rapid resolution undermined the task effectiveness. They reflected that, although they built interdependence into the group structure, the computer software did not build interdependence into its structure and this was a weakness that undermined the effectiveness of the activity. The integration of the problem solving activity into a curriculum unit was found to be a far more effective approach to supporting student learning from the exercise, than using it as a relatively stand-alone activity. The authors emphasised the need to manage the interpersonal skill development well to enable co-operative tasks to support learning goals.

Nuthall (1999)³³⁹ cited Miller's (1987) observations of the 'co-construction of negations':

One student makes a claim on the basis of experience, and another student makes a contrary claim on the basis of different personal experience. If both claims cannot be denied by either, then they have co-constructed a negation that must be resolved. It is the reflective resolution of such negations that leads to the creation of more advanced cognitive structures.' (p.695).

Alton-Lee, Town, Stevenson, Diggins and Molloy (2001)³⁴⁰ report a teacher's effective use of students' co-construction of negations in a New Zealand Year 10 social studies class to address racism after a student called out the word 'mongrel' to describe an American of Afro-American and European American lineage. They highlight effectiveness of this pedagogical strategy for addressing racism in social studies in the light of much international research demonstrating the inadvertent exacerbation of racism by teachers (Cole, 1998³⁴¹; Donn & Schick, 1995³⁴²; Osler & Starkey, 1999³⁴³; Seixas, 2001³⁴⁴). Shaver (1999)³⁴⁵ identifies a range of effective approaches to support cognitive prejudice reduction as a key strategy for reducing prejudice through social studies.

There has been New Zealand and international evidence where co-operative work in mathematics is particularly ineffective. This occurs when co-operative tasks have been insufficiently structured to keep students engaged with mathematical ideas and social interaction displaces mathematical learning (Higgins, 1998³⁴⁶; Stein, 2001). Higgins (1998) found that group settings provided by New Zealand junior school teachers frequently did not involve carefully structured tasks or classroom norms that kept students engaging with mathematical ideas or concepts. Higgins' research exemplifies a case where social norms fostered by the lack of task structure took precedence, and academic norms were infrequently developed in the peer culture.

337 Blaye, A. (1990). Peer interaction in solving a binary matrix problem: Possible mechanisms causing individual progress. In H. Mandl, E. de Corte, N. Bennett, & H.F. Friedrich (Eds.), *Learning and instruction: European research in an international context* (Vol. 2, pp. 45-46). Oxford: Pergamon Press.

338 Inder, P., & Todd, R. (1993). Conflict and resolution during co-operative learning with computers. *SET*, 2.

339 Nuthall, G. (1999). Learning how to learn: The evolution of students' minds through the social processes and culture of the classroom. *International Journal of Educational Research*, 31(3), 139-256.

340 Alton-Lee, A. Town, T., Stevenson, M., Diggins, C. & Molloy C. (2001). Making a difference? A role/requiem for classroom research. *Unterrichts wissenschaft*, 3, 197-212.

341 Cole, M. (1998). Racism, reconstructed multiculturalism and antiracist education. *Cambridge Journal of Education*, 28 (1), 37-48).

342 Donn, M., & Schick, R. (1995). *Promoting positive race relations in New Zealand schools: Me mahi tahi tatou*. Wellington: Research Division, Ministry of Education.

343 Osler, A., & Starkey, H. (1999). Rights, identities and inclusion: European action programmes as political education. *Oxford Review of Education*, 25 (Nos. 1 & 2), 199-215.

344 Seixas, P. (2001). Review of research on social studies. In V. Richardson (Ed.). *Handbook of Research on Teaching (Fourth Edition)*. Washington D.C: American Educational Research Association.

345 Shaver, J. (1999). Social Studies: Cognitive prejudice reduction. In G. Cawelti (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

346 Higgins, J. (1998). *Learning and teaching mathematics in the first two years at school: Groupwork, independence, and understanding*. Unpublished doctoral thesis, Victoria University.

The evidence shows how the range, sequences and interdependencies of task contexts can influence student achievement. A skilled teacher optimises task sequences not only to directly facilitate the different stages of learning cycles for individual students, but also to build up a peer learning culture that can intensify the challenges and supports for learning.

(VII) Curriculum Goals, Resources including ICT Usage, Task Design and Teaching are Effectively Aligned

Research-based characteristics

- Curricular alignment: The use of resources, teaching materials and ICT is aligned with curriculum goals to optimise student motivation and accomplish instructional purposes and goals.
- Curricular alignment optimises rather than inhibits critical thinking.
- Pedagogical strategies are evaluated in relation to curricular goals.
- ICT usage is integrated into pedagogical practice across the curriculum.
- Quality teaching is optimised when there is whole school alignment around evidence-based practices.
- The school maintains an 'unrelenting focus on student achievement and learning'³⁴⁷.
- There is whole school alignment and coherence across policies and practices that focus on, resource and support quality teaching for diverse students.
- Pro-active alignment across the school supports effective inclusion of diverse students within the school community.
- Whole school alignment optimises opportunity to learn, particularly in language immersion, literacy, ICT, social studies and health.
- Whole school alignment enables a common language, teacher collaboration and reflection and other synergies around improving teaching.
- Whole school alignment minimises disruptions to quality teaching and sustains continuous improvement.
- School policies and practices initiate, and support teachers in maintaining, school-home partnerships focused on learning.

Curricular Alignment

In emphasising the importance of instructional alignment, Brophy (2001)³⁴⁸ provides an overview of key barriers to student achievement. Brophy summarises the research on the problem of curricular alignment as one where many forces are acting on schooling to undermine a necessary focus on powerful ideas connected to important goals. He cites the expansion of learning materials and texts in response to pressure groups, lack of alignments between educational resources and curricular goals, teachers' focus on content coverage, inappropriate assessment, and the separation of skills teaching from knowledge content rather than integration of the two. New Zealand examples have been evident in some add-on approaches to drug education through special programmes. For example, an evaluation of the Drugs Education Development Project (DEDP), carried out by the Centre for Child and Family Policy Research and the Injury Prevention Research Centre (2000)³⁴⁹ raised many questions about the effectiveness of these programmes for students. A key problem in such interventions has been the failure to align 'add-on' interventions with the ongoing school programme.

Brophy emphasizes classroom research as revealing the disconnection of curriculum from students' lives. He cites the loss of educator focus on the knowledge, skills, attitudes, values and dispositions that a society wishes to develop in its citizens. He emphasises the need for students to understand the reasons why they are learning what they learn and how it connects to the wider community.

In its 2001 report, ERO³⁵⁰ report lack of curricular alignment as a key concern across many curricular areas. For example, ERO noted that lack of alignment between new curriculum and teaching/learning resources has been a weakness in practice in mathematics teaching (p.15). ERO expressed concern also about the failure of teachers to recognise inter-dependence of processes and knowledge strands in social studies and the need for integration of these in practice (p.37). However, ERO has identified the

347 Hopkins, D. (2001). *School improvement for real*. London: Routledge. (p. 185)

348 Brophy, J. (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8*. New York: Elsevier.

349 Centre for Child and Family Policy. Research and Injury Prevention Research Centre. (2000). *Final Report for the Evaluation of the Drugs Education Development Project: Report to the Ministry of Education, Auckland Uniservices*. Wellington: Ministry of Education.

350 Education Review Office (2001). *ERO Reviews. Future Directions: Analysis of responses*. <http://www.ero.govt.nz/whatsnew/index.htm>

inclusion of achievement objectives in the mathematics curriculum as providing teachers with a 'better understanding about the connection between the content of their programmes and the learning outcomes children are expected to achieve' (p.16).

Feedback from the Curriculum Stocktake Reference Group has been consistent that there has been a problem in the integration of skills in the national curriculum (although national monitoring at Year 4 suggests much has been achieved in the area of graphs, tables and maps). The Curriculum Stocktake Reference Group has reported elsewhere that there has been a perceived gap in the integration and reinforcement of the shared values of the New Zealand curriculum.

An example of the potential for instructional strategy to conflict with curriculum goals is the use of the 'similarities and differences' focus as an analytical tool in social studies. Identifying similarities and differences is the metacognitive strategy that showed the highest effect size (1.61) of any single classroom variable linked to learning outcomes in Marzano, Pickering and Pollock's (2001)³⁵¹ meta-analysis. However, the potential influence of this strategy can be a two-edged sword if used without sufficient consideration of the impact of binary thinking on what students learn. This strategy can be a risk in teaching in social studies where, unless the strategy is aligned with the curriculum goals, unintended social and academic outcomes can occur. For example, if teachers use a kind of formulaic question task: 'How are people in Nigeria similar to and different from us?' the use of the similarities and differences approach may inadvertently focus students on 'us' and 'other', or 'them' and 'us' distinctions (Johnstone, 1987)³⁵². Such an approach has also been labelled as a kind of 'tourist curriculum' approach which can entrench racism rather than a valuing of diversity³⁵³. Shaver's (1999)³⁵⁴ summary of research about improving outcomes in social studies emphasises increasing students' cognitive sophistication in social studies and reducing simple generalisations and stereotypes to assist 'cognitive prejudice reduction' (p. 189). More research is needed to investigate why social studies teaching has so often been found to bring about outcomes contrary to the curricular goals³⁵⁵.

A further New Zealand example of lack of curricular alignment showed Year 5 students in four classes to become less concerned about endangered animals and pollution after an instructional unit designed to increase student knowledge and concern about these issues³⁵⁶. The findings revealed that students developed a kind of learned-hopelessness about the issues as they received more information about the problems and threats without a pedagogical approach that enabled them to develop a sense of agency in their own context. For example, students wanted to develop a recycling plan for the school but the teacher explained that changing school practices would not be feasible. Also children applied schema they had learned previously about the utility of animals, although such information was not given during the unit. Many children reported that it would matter if all the elephants in the world died out, but their reasoning was that it mattered because humans would no longer be able to use their skins for clothing and their meat for food! The pedagogy used by the teacher was weak in comparison with the patterned schema students had already internalised in their prior experiences of learning about animals.

The two examples above show that knowing what strategies might raise achievement is not enough if teachers do not also have knowledge of the ways in which the pedagogy and curriculum are interacting to influence student thinking. Such evidence demonstrates the need for teachers to reflect on assessment outcomes in order to understand how classroom practices can optimise alignment. Because each new pedagogical context is complex, systematic and cyclical reflection on outcomes is needed to check the influence on students.

351 Marzano, R., Pickering, D., & Pollock, J. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Virginia: Association for Supervision and Curriculum Development.

352 Johnstone, R. (1987). 'They don't eat like us'. Prejudice and a social studies unit. *SET*, 1 (7).

353 Alton-Lee, A. Town, T., Stevenson, M., Diggins, C. & Molloy C. (2001). Making a difference? A role/requiem for classroom research. *Unterrichts wissenschaft*, 3, 197-212.

354 Shaver, J. P. (1999). Social Studies. In G. Cawelti (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

355 Seixas, P. (2001). Review of research on social studies. In V. Richardson (Ed.). *Handbook of Research on Teaching (Fourth Edition)*. Washington D.C: American Educational research Association.

356 Alton-Lee, A. (1983). Organising for learning: The results of an ecological study. *SET Research Information for Teachers*, No 2, Item 5.

This principle of alignment does emphasise coherence but does not imply a bland set of curricular resources and pedagogical strategies that provide a sanitised path to learning outcomes. Exposing students to different mental strategies, multiple metacognitive tools, competing world views and the diversity of curriculum -relevant knowledge sources available are all important ways to develop the essential skills of critical and creative thinking. As reported elsewhere in this synthesis, when curricular resources provide competing world views, the teacher's role in using effective pedagogy and enabling students to use critical thinking skills can be fundamental to quality teaching³⁵⁷.

Quality Teaching Effectively Integrates the Use of ICT-rich Environments into Pedagogical Practices in Ways that Support Student Learning.

In their 2001 evaluation report to the DfEE in the UK³⁵⁸, the British Educational Communications and Technology Agency (BECTA) found overall that students in primary and secondary schools with ICT-rich environments achieved more highly across the curriculum than students in schools with poor ICT provisions. What is particularly significant about these findings, given the persistence of poorer performance in low decile schools in New Zealand, is that the U.K. analyses showed links to higher achievement irrespective of the socio-economic level of students. Alton-Lee and Praat (2000)³⁵⁹ found that little New Zealand research had attended specifically to issues of ICT usage for Māori and Pasifika students linked to student outcomes, in mainstream classes.

The U.S. Department of Education (2000)³⁶⁰ syntheses of meta-analyses on the use of computers in classrooms also found a consistent positive effect of computer usage, ranging from an effect size of 0.25 to 0.40. The effect sizes seem to be increasing over time but the variation may also be explaining variations in the effectiveness of usage for diverse students. In these recent U.S. results the benefits were reported to be strongest for students of lower SES, low achievers and those with learning problems. The U.K. BECTA analyses show a direct link to achievement within specific curricular areas, and even stronger impact when ICT-rich environments are used across the curriculum. It appears that the effect of ICT-rich environments is becoming more pronounced on student learning as technological inefficiencies and student access barriers are overcome.

These large studies appear to be capturing a very recent change whereby computers are becoming more effective, integrated into, and aligned with, pedagogical practice. Gallego, Cole and the Laboratory of Comparative Human Cognition (2001), in their review of research submitted for publication previous to the release of the two large studies cited above, concluded that: 'no quantum leap in educational achievement can be associated broadly with the inclusion of computers as instructional media in standard classrooms' (p. 990). These reviewers found the realisation of the potential of computer use to be dependent upon the reorganisation of classrooms to support heavy computer usage and student access, alignment with curriculum, and teacher preparation and experience.

As illustrated also in two studies of effective computer use in senior secondary schooling, international research finds that the effectiveness of ICT usage is closely tied to the quality of teaching. Wandersee (2001)³⁶¹ summarises findings from research about ICT usage in biology teaching:

When the teacher actively directs students' attention and probes their scientific thinking by eliciting prediction and hypothesizing while they are using the computer to visualise their data, then students will make greater efforts to interpret and explain their data. Yet even the best biology simulation software can seed alternative conceptions (misconceptions) unless students' thinking is

357 Alton-Lee, A.G. with McBride, T., Greenslade, M. and Nuthall, G. (1997). *Gendered discourses in social studies: intermediate students' learning and participation during studies of Antarctic work and survival focused on women*. Report to the Ministry of Education. Understanding Learning and Teaching Project 3. Wellington: Ministry of Education.

358 BECTA (2001). *The secondary school of the future: A report to the DfEE by Becta*. <http://www.becta.org.uk/news/reports/secondaryfuture/>

359 Alton-Lee, A., & Praat, A. (2000). *Explaining and addressing gender differences in the compulsory school sector: A literature review 1989-1999*. Wellington: Ministry of Education.

360 U.S. Department of Education (2000). *Monitoring school quality: An Indicators Report*. Washington D.C.: Office of Educational Research and Improvement.

361 Wandersee, J.H. (2001). High school biology instruction: Targeting deeper understanding for biological literacy. In J. Brophy, (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching*. Vol. 8. New York: Elsevier.

artfully probed during the experience and students are debriefed after it.
(p.207).

Treagust and Chittleborough (2001)³⁶² reviewed research on the use of microcomputers in chemistry teaching. When the use of microcomputers was compared with that of chemical indicators and pH meters in student performance of titrations, students using the microcomputer-based laboratories made greater improvement in conceptual understanding.

Whole-School Alignment

Along with the finding that far more variance in student scores is attributable to between teacher/class differences than between school differences, the principle of whole school alignment is emerging as having a significant value-added effect on student outcomes, particularly social outcomes. This issue needs to be taken up in more depth in further best evidence synthesis work. In this section of the '*Quality Teaching for Diverse Students*' best evidence synthesis some emerging findings are reported. Darling-Hammond (1997)³⁶³ in her synthesis of research concluded that:

Schools structured for success organise teachers' and students' work together in ways that get beyond bureaucracy to produce a collective perspective across the school.

A collective perspective across the school can assist teachers in working with the cultures of the students in the school and strengthen ongoing interactions with parents to support student learning (Epstein, 2001)³⁶⁴.

Luke, Matters, Herschell, Grace, Barrett, and Land, R. (2000)³⁶⁵ identify school-based alignment between curriculum, pedagogy and assessment as one of the five fundamental research-based premises of the New Basics project to improve student outcomes in Queensland.

While the outcomes-linked evidence shows marked variability between teachers and classes within schools, studies of educational change and improvement show that quality teaching can be supported, enhanced and sustained when whole school processes maintain a focus on achievement (McLaughlin & Mitra, 2001)³⁶⁶. Students gain cumulative benefit from class to class and year to year when there is whole school alignment that optimises quality teaching. There is New Zealand evidence of this finding from school support initiatives in Mangere and Otara. The researchers concluded that classroom teaching needs to be situated within a schooling context where school leadership and teachers are focused on raising student achievement³⁶⁷. The principle of whole school alignment has been evident also within Māori-medium education. The higher performance of Māori students at 5th and 6th form level in Māori medium and bilingual schools, compared with the performance of Māori students in immersion or bilingual units within mainstream schools, may provide an indicator about the importance of this factor for Māori students³⁶⁸.

Newmann, Smith, Allensworth and Bryk (2001)³⁶⁹ found 'a strong positive relationship between improving coherence and improved student achievement' in reading and mathematics in Chicago schools (p. 305). They found both principals and teachers played a key role in ensuring coherence or alignment and identified the following areas of focus to improve achievement:

- a common approach across teachers,

362 Treagust, D., & Chittleborough, G. (2001). Chemistry: A matter of understanding representations. In J. Brophy, (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8.* New York: Elsevier.

363 Darling-Hammond, L. (1997). *The right to learn: A blueprint for creating schools that work.* San Francisco: Jossey-Bass Publishers.

364 Epstein, J.L. (2001). *School, family and community partnerships: Preparing educators and improving schools.* Boulder, Colorado: Westview Press.

365 Luke, A. Matters, G., Herschell, P., Grace, N., Barrett, R., & Land, R. (2000). *New Basics Project: Technical paper.* Queensland: Education Queensland.

366 McLaughlin, M.W., & Mitra, D. (2001). Theory-based change and change-based theory: Going deeper, going broader. *Journal of Educational Change*, 2, 201-323.

367 Robinson, V., Timperley, H., Bullard, T. (2000). *Strengthening education in Mangere and Otara Evaluation: Second Evaluation Report.* Auckland: Auckland Uniservices Ltd.

368 Minister of Education. (2001). *New Zealand Schools Nga Kura o Aotearoa: A report on the compulsory school sector in New Zealand 2000.* Wellington: Ministry of Education.

369 Newmann, F.M. Smith, B., Allensworth, E., and Bryk, A. S. (2001). Instructional program coherence: What it is and why it should guide school improvement policy. *Educational Evaluation and Policy Analysis*, 23(4), 297-322.

- intensive professional development to support the goal of a common approach,
- agreement on the resources selected to ensure coherence with instructional goals,
- ongoing processes of, and structures for, teacher collaboration to support cross-school coherence,
- teacher agreement about key instructional strategies,
- teacher collaboration about appropriate achievement expectations, and
- channelling of community resources to support a core instructional programme.

This principle of whole school alignment is evident also in the international literature about effectiveness of particular curricular areas, for example, in ICT use³⁷⁰ and social studies³⁷¹. Alignment across whole school policies and communities has been found to be critical also for developing safe environments where students respect each other, and bullying and violence is reduced^{372 373}.

No matter how inclusive quality teaching is within a single class, if a student moves from an inclusive environment into playground and lunch break environments that taunt and humiliate, then quality classroom teaching will be undermined. One New Zealand study³⁷⁴ recorded the use of social studies to support a whole school approach to the effective inclusion and involvement in the school community of Zack, a Year 5 student with spina bifida. The research design investigated the links between changes in new entrant student knowledge, values and attitudes, and a range of pedagogical strategies designed to support the inclusion of Zack. The study illustrated the importance of cross-school alignment in educational inclusion of a Year 5 student, through his involvement with the new entrant class in the school.

The study emphasises the importance of the teacher's role in structuring a learning environment where peers respect and benefit from each other and the curricular goals are achieved in the social practice of the students. New Zealand teacher, Lena Klenner, planned and incorporated a range of roles for Zack, for example, as older helper in a peer tutoring programme, and knowledgeable informant about spina bifida within the ongoing class social studies programme. She emphasised shared interests amongst many of the children to ensure his positioning in the school community as 'us' rather than 'other' ('we cricketers'). Zack functioned as a valued and knowledgeable informant of the younger children who learned how to respect him (including observing wheelchair protocol), and were able to expand their curriculum learning through his involvement. After the unit, interviews with the students revealed considerable respect for Zack as a person, tutor, mentor, role model and so on. Video records showed Zack's wheelchair to often be at the centre of student groupings rather than on the edge, and the wheelchair itself was not a focus of the children's thinking when they remembered Zack. Zack's capabilities rather than his disability were the focus of their attention. These links between pedagogical practice and outcome across cognitive, values, and attitudinal outcomes are significant in the light of substantial research showing peer cultures in which students taunt, exclude or pity their peers with special needs.

The principle of whole school alignment is particularly critical for effectiveness in health education. In her literature review Shaw (1994)³⁷⁵ found that the most successful social action for health education programmes made health promotion a part of school life and the wider school environment, or integrated health education across the curriculum³⁷⁶.

370 BECTA (2001). *The secondary school of the future: A report to the DfEE by Becta*. <http://www.becta.org.uk/news/reports/secondaryfuture/>

371 Torney-Purta, J., Hahn, C., & Amadeo, J. (2001). Principles of subject-specific instruction in education for citizenship. In J. Brophy, (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8*. New York: Elsevier.

372 Carosi, F., & Tindale, R. (1995). Give me a helmet. In R. Browne and R. Fletcher (Eds.), *Boys in schools* (pp. 26-40). Australia: Finch Publishing.

373 Alton-Lee, A., & Praat, A. (2000). *Explaining and addressing gender differences in the compulsory school sector: A literature review 1989-1999*. Wellington: Ministry of Education.

374 Alton-Lee, A., Rietveld, C., Klenner, L., Dalton, N., Diggins, C., & Town, S. (2000). Inclusive practice within the lived cultures of school communities: Research case studies in teaching, learning and inclusion. *International Journal of Educational Inclusion*, 4(3), 179-210.

375 Shaw, H. (1994). *Health and Physical Well-being. Literature review prepared for the Ministry of Education. Part B: Health Education*. Wellington.

376 Jensen, B. (1991). Health education in holistic perspective and children's concepts of health. In D. Nutbeam, B. Haglund, P. Farley, and P. Tilgren (Eds.), *Youth health promotion: From theory to practice*. London: Forbes, 89-107.

In summary, despite the relatively high impact of classroom teaching compared with school effect on student outcome, the principle of whole school alignment is emerging as having a value-added effect on outcomes for diverse students, particularly social outcomes. Whole school alignment can enhance the focus on achievement, provide a sustainable foundation for strong school-home partnerships, optimise inclusion (rather than exclusion) across the daily experiences of diverse students, and increase opportunity to learn, particularly in language immersion, literacy, ICT, social studies, and health education. Whole school alignment can optimise collaboration and provide processes to support, resource and sustain quality teaching.

The significance of pedagogical alignment is emerging across the curriculum, and particularly in the context of ICT. This principle of alignment explains why 'add-ons' imposed upon curriculum and conflicting interventions can be ineffective or even counterproductive for students. These findings not only emphasise the instrumental and integrative role of the teacher in aligning resources, equipment, ICT, curriculum and teaching, but also that of school leadership in supporting and resourcing coherent programmes. Whole school policies and practices are particularly critical in initiating and sustaining effective school-home partnerships.

(VIII) Pedagogy Scaffolds and Provides Appropriate Feedback on Students' Task Engagement

Research-based characteristics

- Tasks and classroom interactions provide scaffolds to facilitate student learning (the teacher provides whatever assistance diverse students need to enable them to engage in learning activities productively, for example, teacher use of prompts, questions, and appropriate resources including social resources).
- Quality teaching develops all students' information skills and ensures students' ready access to resources when needed to assist the learning process.
- Students receive effective, specific, appropriately frequent, positive and responsive feedback. Feedback must be neither too infrequent so that a student does not receive appropriate feedback nor too frequent so that the learning process is subverted.

Scaffolding Learning

Brophy (2001)³⁷⁷ explained the principle of scaffolding³⁷⁸:

The principle of teaching within the students' zones of proximal development³⁷⁹ implies that students will need explanation, modelling, coaching, and other forms of assistance from their teachers, but also that this teacher structuring and scaffolding of students' task engagement will be faded as students' expertise develops. Eventually, students should be able to autonomously use what they are learning and regulate their own productive task engagement (Brophy & Alleman, 1991³⁸⁰; Rosenshine & Meister, 1992³⁸¹; Shuell, 1996³⁸²; Tharp & Gallimore, 1988³⁸³). (p. 15).

The term 'scaffolding' raised concerns with our reviewers and others partly because of the unfortunate western and historical associations with the metaphor as gibbet or gallows. It has also been the subject of critique because it is seen to be too focussed on teacher provision, and others use alternative terms such as 'weaving' (Dyson, 1990)³⁸⁴, 'bridging' (Oser & Baeriswyl, 2001)³⁸⁵ and 'co-construction' to emphasise student agency, joint activity and the interactive nature of 'scaffolding' in learning. These latter critiques arise because the term scaffolding has so often been applied directly to teacher-student interaction and perhaps has underestimated the role of peers in a kind of co-scaffolded process of interaction during learning tasks. Others also struggle to find a term that will communicate this concept of teacher scaffolding. Bishop et al. (in progress) use a term adapted from the language of assessment 'feed forward' (cf feed back) to describe the kind of assistance and information that Year 9 and 10 Māori students are seeking from teachers.

It is clear that the term 'scaffolding' has drawbacks and a new term needs coining, but at this time the alternative terms that are emerging do not yet carry with them the rich tradition of research associated with the metaphor used by Vygotsky (1978)³⁸⁶⁻³⁸⁷ and Bruner (1966)³⁸⁸. For example, co-construction does not convey the substantial teacher agency in actively scaffolding a learning environment where co-construction and knowledge 'weaving' can flourish. Accordingly, the term 'scaffolding' is used with

377 Brophy, J. (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8.* New York: Elsevier.

378 See also Hammond, J. (2001). *Scaffolding: teaching and learning in language and literacy education.* Newtown, NSW, Australia: Primary English Teaching Association.

379 The term 'zone of proximal development' is translated from the Russian and derived from the work of Vygotsky, L.S. (1978). *Mind and society.* Cambridge, MA: Harvard University Press.

The zone of proximal development is defined as '...the distance between the actual development level (of the learner) as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers' (p. 86).

380 Brophy, J., & Alleman, J. (1991). Activities as instructional tools: A framework for analysis and evaluation. *Educational Researcher*, 20, 9-23.

381 Rosenshine, B., & Meister, C. (1992). The use of scaffolds for teaching higher-level cognitive strategies. *Educational Leadership*, 49, 26-33.

382 Shuell, T. (1996). Teaching and learning in a classroom context. In D. Berliner & R. Calfree (Eds.), *Handbook of Educational Psychology*, (pp. 726-764). New York: MacMillan.

383 Tharp, R., & Gallimore, R. (1988). *Rousing minds to life: Teaching, learning and schooling in social context.* Cambridge: Cambridge University Press.

384 Dyson, A.H. (1990). Weaving possibilities; Rethinking metaphors for early literacy development. *The Reading Teacher*, 44(3), 202-213.

385 Oser, F.K., & Baeriswyl, F.J. (2001). Choreographies of teaching: Bridging instruction to learning. In V. Richardson (Ed.). *Handbook of Research on Teaching (Fourth Edition)*. Washington D.C: American Educational Research Association.

386 Vygotsky, L.V. (1978). *Mind in society.* Cambridge: MA: Harvard University Press.

387 E. Forman, N. Minick, & C.A. Stone (1993).(Eds.). *Contexts for Learning: Socio-cultural dynamics in children's development.* Oxford, U.K.: Oxford University Press.

388 Bruner, J. (1966). *Towards a theory of instruction.* Cambridge, MA. : Belknap Press.

caution, and in association with other synonyms, but is presented as a critical concept in explaining the nature of quality teaching that carries a strong qualitative evidence base with it. In addition, special consideration is given to the Māori concept of 'poutama' used by some Māori educators as an alternative metaphor for scaffolding (Royal Tangaere, 1997)³⁸⁹. A poutama is a lattice weaving design symbolising a stairway. The woven staircase symbol addresses some of the drawbacks of the scaffolding metaphor (given the implicit notion of knowledge as a building). The poutama is represented in a tukutuku (actual lattice weaving using a woven staircase design) (Royal Tangaere, 1997)³⁹⁰. Royal Tangaere (1997) describes the cultural origins of the poutama as symbolising the quest for knowledge through the woven staircase. She explains the poutama symbol as showing the necessarily social nature of the learning process.

Royal Tangaere (1997) has depicted the poutama as a woven staircase where each stair represents a new zone of proximal development built on a previous zone of proximal development. She explains the different woven paths as representing the inter-relatedness of the physical, emotional, cognitive, social, spiritual and cultural dimensions of learning. She elaborates that the poutama also represents learning as 'a process which involves a period of time for the task or activity to be understood' (p. 48). The 'scaffolding' metaphor carries with it a notion of knowledge as a building which is a static and highly structured image. The poutama metaphor does not give away the importance of structure in knowledge construction. However, the poutama symbol carries with it the notion of knowledge as an inter-related and accumulating stairway that in itself opens up opportunity. There is an increasingly rich research tradition emerging in New Zealand about the nature of effective scaffolding, particularly in Māori medium settings (e.g. Hohepa, Hingaroa Smith, Tuhiwai Smith and McNaughton, 1992³⁹¹; Ngāutauta Skerrett White, 1995³⁹²). Hohepa et al.'s research is discussed in detail later in this section. Ngāutauta Skerrett White (1995)³⁹³ reports analyses of scaffolding processes in a Kōhanga Reo and her findings provide a detailed analysis of the subtle ways in which verbal and non-verbal scaffolding support joint activity and learning. Non-verbal scaffolds identified by Ngāutauta Skerrett White include gestures, body movement, intonation and use of materials by both teacher and peers.

In this synthesis 'scaffolding' does imply substantial teacher agency in structuring learning environments, resources, and peer interaction opportunities but is not intended to imply that scaffolding in practice is always a case of very structured teacher-student interaction towards a goal. Rather, a teacher's scaffolding of the learning environment should facilitate a range of rich learning-focused interactions between learners and tasks, learners and resources, learners and peers, and learners and teachers, where teacher and learner frequently take reciprocal or tuakana-teina roles. This approach acknowledges the centrality of the co-construction of meaning between teachers and learners, and learners and learners. It also fits with the principle of 'ako' meaning 'to learn as well as teach' (p. 50, Royal Tangaere, 1997)³⁹⁴. The concept of 'ako' is explained more fully in Royal Tangaere (1997)³⁹⁵ and Pere (1988³⁹⁶; 1994³⁹⁷) and elaborated in the companion best evidence synthesis by Farquhar (2003)³⁹⁸.

389 Royal Tangaere, A. (1997). Māori human development learning theory. In P. Te Whaiti, M. McCarthy & A. Durie (Eds.), *Mai I Rangitaatea Māori well-being and development*. Auckland : Auckland University Press with Bridget Williams Books

390 Royal Tangaere, A. (1997). Māori human development learning theory. In P. Te Whaiti, M. McCarthy & A. Durie (Eds.), *Mai I Rangitaatea Māori well-being and development*. Auckland : Auckland University Press with Bridget Williams Books

391 Hohepa, M., Hingaroa Smith, G., Tuhiwai Smith, L., & McNaughton, S. (1992). Te Kohanga Reo hei Tikanga ako I te Reo Māori: Te Kohanga Reo as a context for language learning. *Educational Psychology*, 12 (3 & 4): 333-346.

392 Ngāutauta Skerrett White, M. (1995). *Te wero - Te uru whakatupu ake te uru o matawhaura. Language scaffolding in a Kōhanga Reo*. Unpublished thesis submitted in partial fulfilment of a Degree of Master of Philosophy in Education. Auckland: University of Auckland.

393 Ngāutauta Skerrett White, M. (1995). *Te wero - Te uru whakatupu ake te uru o matawhaura. Language scaffolding in a Kōhanga Reo*. Unpublished thesis submitted in partial fulfilment of a Degree of Master of Philosophy in Education. Auckland: University of Auckland.

394 Royal Tangaere, A. (1997). Māori human development learning theory. In P. Te Whaiti, M. McCarthy & A. Durie (Eds.), *Mai I Rangitaatea Māori well-being and development*. Auckland: Auckland University Press with Bridget Williams Books.

395 Royal Tangaere, A. (1997). Māori human development learning theory. In P. Te Whaiti, M. McCarthy & A. Durie (Eds.), *Mai I Rangitaatea Māori well-being and development*. Auckland: Auckland University Press with Bridget Williams Books.

396 Pere, R. (1988). Te wheke: Whaia te maramatanga me te aroha. In S. Middleton (Ed.), *Women and education in Aotearoa*. Wellington: Allen & Unwin Ltd.

397 Pere, R.R. (1994). *Ako: Concepts and learning in the Māori tradition*. Wellington: Te Kohanga Reo National Trust.

398 Farquhar, S. (2003). *Quality Teaching - Early Foundations: Best evidence synthesis*. Report prepared for the Ministry of Education. Wellington: Ministry of Education.

The importance of scaffolding learning through tasks, peer culture and even the teacher's direct assistance has not always been accepted in New Zealand teaching practice across the curriculum, particularly at the early primary level in mathematics. Higgins (1998)³⁹⁹ found that one of the teacher beliefs that led to a non-productive model of student group work in junior school mathematics in New Zealand classrooms was a philosophical belief in *readiness*. That is; teachers believed that the child will learn when he or she is ready, and it is not the teacher's role to step in and scaffold the student from what they now know to the next step in the learning process.

However, it has been increasingly apparent in research across the curriculum that the teacher's ability to scaffold learning and to create a learning environment that scaffolds a student's understandings is crucial to teaching effectiveness. McDonald (1993)⁴⁰⁰ illustrates the effect of use of scaffolding to teach students thinking skills in the context of literacy teaching in New Zealand junior classrooms. For example, the teacher encourages a child to re-run to find out whether their interpretation of a text passage makes sense, leaves gaps in text as she is reading to engage the students in predicting the missing word, and plays 'spot the mistake'. She focuses students on 'the problem in the story', requiring them to go beyond the text to infer meaning, and encourages reflection. McDonald points out that the teaching of thinking skills is inextricably embedded within literacy instruction. She also provides an analysis of the ways in which these kinds of skills model the verbal reasoning styles used in intelligence tests.

The practices observed by McDonald (1993) reflect the substantial influence of Marie Clay's (1979)⁴⁰¹ landmark research and development on scaffolding in New Zealand junior classes. Clay's work explicitly challenged the view of readiness and led to the widespread use of diagnostic techniques such as the running record as a foundation for scaffolding children's reading and specific strategies for scaffolding such as the Cloze techniques requiring children to respond to gaps in text. The influence of the work of Clay and other leading reading educators in the 1970s, 80s and 90s contributed to the embedding of scaffolding into the teaching of reading in New Zealand classrooms.

Alton-Lee, Diggins, Klenner, Vine and Dalton (2001)⁴⁰² traced the links between the complexity of a teacher's scaffolding of whole class discussion in social studies with new entrants, and the quality of discourse elicited. Strategies used included questions as prompts, interrogative repetition, eliciting examples through contrasting experience and, most importantly, sustained wait time. The wait time was frequently longer than three seconds with these young students, but effectively scaffolded complex vocabulary and explanation from the five-year-olds in this decile 3 school, for example, an x-ray 'takes a picture of your bones'.

The degree to which a teacher is skilled at scaffolding learning is likely to be closely linked with the extent to which a teacher is effective with diverse learners. The alternative 'readiness' model advantages students who bring school-related skills or knowledge to the learning process. Some New Zealand research on very low achievers suggests that what may have been particularly absent in the classroom experiences of very low achievers is skilful scaffolding of the learning process. Phillips and Smith (1999)⁴⁰³ emphasise the importance of prompts as scaffolds when working with 'third chance' students who constitute those 1000 or so seven-year-olds in New Zealand schools each year who do not succeed within Reading Recovery and are recommended for specialist help. They developed a 'skeleton of powerful prompts' or organising framework derived from the research literature, and ranked according to the amount of support they offered the child. Teachers are assisted to observe student behaviour closely, keep detailed daily on-the-run records, carry out clinical analyses of the child's responding, and use the information to plan effective and responsive instruction. This formal

399 Higgins, J. (1998). *Learning and teaching mathematics in the first two years at school: Groupwork, independence, and understanding*. Unpublished doctoral thesis, Victoria University.

400 McDonald, G. (1993). Learning to be intelligent or 'Oh good, that was clever!': Teaching how to think. *SET*, 2.

401 Clay, M. (1979). *Reading: The patterning of complex behaviour*. Auckland: Heinemann.

402 Alton-Lee, A., Diggins, C., Klenner, L., Vine, E., & Dalton, N. (2001). *Teacher management of the learning environment during a social studies discussion in a new-entrant classroom in New Zealand*. *The Elementary School Journal*, 101 (5), 549-566.

403 Phillips, G., & Smith, P. (1999). *A third chance to learn*. *SET*, 1 (11).

teacher self-monitoring approach enabled a success rate of 85.7% with Māori students in the 'third chance' category and a success rate of 76.9% with students from non-English speaking backgrounds⁴⁰⁴.

Hohepa, Hingaroa Smith, Tuhiwai Smith and McNaughton (1992)⁴⁰⁵ emphasise the critical role that scaffolding plays in language learning in Māori medium. They identified four frequently occurring scaffolding practices in their observations in Te Kohanga Reo: modelling, prompting, prompting + modelling, and questioning. An important aspect of the examples and approaches they identified was the use of positive approaches to scaffold Māori language use through modelling the example in Māori or asking a question in Māori. For example (with English translations shown in brackets):

- Whaea (teacher): He aha teenei? (*What is this?*)
Child: Um, um he church. (*Um, um, a church.*)
Whaea: He haahi teenei. He whare karakia. (*This is a church. A house of prayer.*)
Child: Ae. He whare karakia. Um, teeraa, um, te hui. (*Yes. A house of prayer, Um, that is, um, the meeting.*) (p. 342).

These scaffolds enabled the children to successfully move from English language to Māori language without getting any explicit feedback about 'getting it wrong'. Rather the skilful teaching enabled the children to succeed through the scaffolding process. The scaffolding approaches exemplified here (prompts, modelling, prompts + modelling, and questioning) and variants upon these recur through the research on effective teaching across levels of schooling through to senior school. What is evident in the example above, is the key role effective scaffolding can play in providing a positive while challenging role in supporting student success and self-esteem. That is; effective scaffolding is a key tool for teachers in building not only a successful instructional environment, but also a very positive social environment where teaching practices develop student self-esteem as they promote academic norms.

Effective scaffolding is a key strategy in supporting the learning of diverse students. After tracing the links between teaching and learning of high, average and low achievers, Alton-Lee and Nuthall (1998)⁴⁰⁶ identified vulnerabilities in the learning process that enabled or inhibited learning, and the kinds of scaffolding strategies that countered such vulnerabilities. The teacher's role was critical, not only in ensuring students had access to curriculum-relevant physical resources to assist in obtaining information, but also access to an understanding of what counts as a resource or what constitutes relevant information. When teachers made explicit the links between knowledge and access to information, student agency was supported, assisting students to move away from magical or 'ability-based' attributions about the possession of knowledge. This finding was illustrated in the analysis of a Year 7 Samoan student's access to, and use of, resources that were scaffolded directly by the teacher, and through peer interaction facilitated by the teacher.

Moore (1998)⁴⁰⁷ identified effective teacher scaffolding as important to the development of information skills and information problem solving for New Zealand Year 3 to 6 primary students. Although this study did not make consistent links between teaching practices and student outcomes, the observational data provided examples of more successful teaching strategies in relation to student involvement. Moore (1998) identified 'supported opportunities to think about information in depth' (p. 54), teacher modelling, teacher and student think-aloud problem solving behaviour, and the adapted use of the reciprocal teaching model as more effective scaffolding strategies in the teaching of information skills.

404 Phillips, G., & Smith, P. (1999). *Ibid.*

405 Hohepa, M., Hingaroa Smith, G., Tuhiwai Smith, L., & McNaughton, S. (1992). Te Kohanga Reo hei Tikanga ako I te Reo Māori: Te Kohanga Reo as a context for language learning. *Educational Psychology*, 12 (3 & 4): 333-346.

406 Alton-Lee, A., & Nuthall, G. (1998). *Inclusive instructional design: Theoretical principles emerging from the Understanding Learning and Teaching Project*. Report to the Ministry of Education. Wellington: Ministry of Education.

407 Moore, P. (1998). *Teaching information problem solving in primary schools*. A report for the Ministry of Education. Wellington: Ministry of Education.

Vine and Alton-Lee (2000)⁴⁰⁸ found that a new entrant teacher was effective in scaffolding the learning of a Samoan new immigrant five-year-old, Fa'afetai. The strategies found to support learning occurred when she: engaged in joint activity with him, focused on curriculum learning, listened and observed in order to take up opportunities to make links to curriculum content, made links to his existing knowledge, asked yes/no questions (that enabled cognitive engagement that did not depend on extended language use) and offered relevant statements about curriculum content. A key scaffolding principle was that the teacher supported this ESOL learner through making the implicit explicit. Such scaffolding was possible because the teacher had effectively planned her new entrant programme using Thinking Books and other structured activities to enable one-to-one interactions between herself and individual learners. Alton-Lee and Nuthall (1998)⁴⁰⁹ identified the critical role of whole class discussion for students of low literacy levels, and visual images for ESOL students, in making information accessible. However, visual images were found to be facilitative only of short-term learning outcomes for students who had not had access to actual experience or concrete demonstrations of science concepts taught.

As is apparent in the examples given above, feedback to students is at the heart of effective pedagogy and plays a critical role in scaffolding students' achievement. Hattie (1990)⁴¹⁰ concluded from his synthesis across meta-analytic findings that reinforcement is the single most influential influence on student learning. Black and Wiliam (1998)⁴¹¹ found that a focus on the above aspects of formative assessment results in assessment gains for all students and higher gains for underachievers. Because of the key role that feedback plays in the student learning process, the issue is raised initially in this section as part of the scaffolding process, but taken up again later in this synthesis where there is a focus on the impact of goal-oriented assessment.

Marzano, Pickering and Pollock (2001)⁴¹² found 'setting objectives and providing feedback' to be strongly related to student achievement in their meta-analysis (0.61). The immediacy of feedback plays a key role in its effectiveness across the curriculum including in arts education (Colwell, 1999)⁴¹³. However, it is important to recognise that there are curriculum-specific pedagogical constraints on general findings about assessment, and that these findings are linked to the effectiveness of the assessment in context. For example, in Behets' (1997)⁴¹⁴ study of effective gymnastics instruction in secondary physical education, there was no significant difference between more and less effective teachers in feedback given, but more effective teachers observed the students more. Also, inappropriate use of assessment has been found to undermine student learning. For example, frequent testing has been found to be counterproductive in civics education (Torney-Purta, Hahn & Amadeo, 2001)⁴¹⁵.

In summary, there is substantial evidence of the key role played by effective scaffolding in achieving higher outcomes for diverse students. Scaffolding is the process by which teachers challenge and enable students to move beyond what they can do independently by providing structured assistance. Such scaffolds and resources are built into task design, teacher-student and peer interactions. Scaffolding maximises genuine opportunities to learn. Effective scaffolding practices have played a key role in teaching approaches that have shown the most marked gains for low achievers. Scaffolding is the process not only by which students learn, but also the process whereby they internalise independent learning strategies that are made transparent to them through experiences of being scaffolded by others. Skilled teaching builds care and respect into the learning process through the use

408 Vine, E., Alton-Lee, A. & Klenner, L. (2000). Supporting curriculum learning and language learning with an ESOL learner in a mainstream class. *SET Research Information for Teachers*. No.3. Wellington: NZCER.

409 Alton-Lee, A., & Nuthall, G. (1998). *Inclusive instructional design: Theoretical principles emerging from the Understanding Learning and Teaching Project*. Report to the Ministry of Education. Wellington: Ministry of Education.

410 Hattie, J. (April, 1999). *Influences on student learning*. Inaugural lecture, University of Auckland, New Zealand.

411 Black, P., & Wiliam, D. (1998). *Inside the black box: Raising standards through classroom assessment*. London: King's College, School of Education.

412 Marzano, R., Pickering, D., & Pollock, J. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Virginia: Association for Supervision and Curriculum Development.

413 Colwell, R. (1999). The Arts. In G. Cawelti (Ed.), *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

414 Behets, D. (1997). Comparison of more and less effective teaching behaviours in secondary physical education. *Teaching and Teacher Education*, 13 (2), 215-224.

415 Torney-Purta, J., Hahn, C., & Amadeo, J. (2001). Principles of subject-specific instruction in education for citizenship. In J. Brophy, (2001), (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching*. Vol. 8. New York: Elsevier.

of positive scaffolding practices that enable students to succeed. Effective feedback is one of the strongest influences on student outcomes and is a key aspect of the scaffolding process.

(IX) Pedagogy Promotes Learning Orientations, Student Self-Regulation, Metacognitive Strategies and Thoughtful Student Discourse

Research-based characteristics

- Teaching promotes learning orientations and student self-regulation.
- Teaching promotes metacognitive strategy use (e.g. mental strategies in numeracy) by all students.
- Teaching scaffolds reciprocal or alternating tuakana teina roles in student group, or interactive work.
- Teaching promotes sustained thoughtfulness (e.g. through questioning approaches, wait-time, and the provision of opportunities for application and invention).
- Teaching promotes critical thinking.
- Teaching makes transparent to students the links between strategic effort and accomplishment.

There are now multiple research literatures in different curriculum areas that have identified the sustained higher achievement that occurs when teachers use pedagogical approaches that effectively support students in taking charge of their own learning (e.g. Walberg, 1999)⁴¹⁶. Such approaches not only foster students' 'learning to learn' and 'thinking about thinking' (metacognitive) skills but also support students in self-monitoring.

Donovan, Bransford and Pellegrino (1999)⁴¹⁷, in their review of research on how people learn, concluded that:

A metacognitive approach to instruction can help students learn to take control of their own learning by defining learning goals and monitoring their progress in achieving them. (p.13).

A metacognitive approach to developing student learning orientations and self-regulation has been found to empower students and produce arguably the largest impacts on student achievement of any teaching practice. A contrasting approach is that of the use of behavioural analysis and systematic reinforcement with extrinsic reinforcers driving student engagement. There is undoubtedly a large research literature providing very strong evidence of better outcomes for students, and particularly students with behavioural difficulties, through the use of carefully paced instruction with extrinsic reinforcement. In extreme cases, the use of extrinsic reinforcement may be the only way to engage a learner to the extent that strategy instruction and support can be effective. The research also shows that unless the extrinsic reinforcement is associated with quality teaching, and phased through to intrinsic reinforcement and empowerment of the student as a self-regulated learner, then the aim of self-regulation and intrinsic motivation can be undermined (Dev, 1997)⁴¹⁸.

Brophy (2001)⁴¹⁹ summarises the research linking learning orientations to student outcomes as follows:

The teacher promotes a learning orientation by introducing activities with emphasis on what students will learn from them, treating mistakes as natural parts of the learning process, and encouraging students to work collaboratively and help one another. Students are taught to ask questions without embarrassment, to contribute to lessons without fear of ridicule of their ideas, and to collaborate in pairs or small groups on many of their learning activities. (p. 7)

416 Walberg, H. (1999). Generic Practices: Teaching of learning strategies. In G. Cawelti (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

417 Donovan, M.S., Bransford, J.D., & Pellegrino, J.W. (Eds.). (1999). *How people learn: Bridging research and practice*. Washington DC: National Academy Press.

418 Dev, P. C. (1997). *Remedial and Special Education*, 18(1), 12-19.

419 Brophy, J. (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching*. Vol. 8. New York: Elsevier.

Research indicates the value of establishing a learning orientation by beginning lessons and activities with advance organizers or previews. These introductions facilitate students' learning by communicating the nature and purpose of the activity, connecting it to prior knowledge, and cueing the kind of student responses that the activity requires. This helps students to remain goal oriented and strategic as they process information and respond to the questions or tasks embodied in the activity. Good lesson orientations also stimulate students' motivation to learn by communicating enthusiasm for the learning or helping students to appreciate its value or application potential. (p.11).

Nuthall (1999)⁴²⁰ concluded that teachers need to make transparent goals that relate to the interests and motivations of students. Much research has shown that low-achieving students in particular can attend to procedural matters, and neatness, presentation, compliance, and social and personal concerns rather than curriculum learning (e.g. Bennett & Desforges, 1985⁴²¹; Bennett, Desforges & Cockburn, 1984⁴²²). In the context of an interview exploring why her picture did not show the process of erosion, a low-achieving Year 4 student explained that she understood how the wind and water caused erosion⁴²³. She just did not want to show it in her picture because then the picture would be messy rather than neat. Nuthall's point is that teachers should make explicit, rather than assume, a learning orientation, and ensure that the social organisation of the classroom as well as the task design and teacher discourse makes explicit the learning orientation.

There are key metacognitive and learning-to-learn strategies that assist student learning across the curriculum. For example, students who are given systematic instruction and practice in active listening skill development show learning gains across the curriculum (Dunkel Perry, 1999)⁴²⁴. While metacognitive strategies assist student achievement across the curriculum, subject-specific metacognitive strategies help provide students with specific and structured approaches or frameworks for learning. In the *Interactive Teaching Approach* discussed earlier to exemplify responsive teaching, Biddulph and Osborne (1984)⁴²⁵ used student questions as a strategy to enable students to take a proactive role and a learning orientation to their activity. The process of question asking and answering structured self-regulation, critical thinking and sustained thoughtfulness. In a summary of research on teaching approaches that raise achievement Gabel (1999)⁴²⁶ reported that systematic approaches in problem solving assist students' problem solving success in the sciences. Students are explicitly trained to systematically: (a) analyse and understand the problem, (b) devise a problem-solving plan, (c) carry out the plan, and (d) reflect on the process. Gabel explains that students do not naturally take a systematic approach and need to be trained to do this and to emulate expert problem solvers who take much time to analyse a problem before attempting a solution.

Swan and White (1994)⁴²⁷ describe the use of *Thinking Books* to help make the learning process more effective with eight-year-olds, to combat the problem of 'shallow learning' in class. The Thinking Books are a pedagogical tool for establishing learning orientations in students. Each student has a special exercise book called a Thinking Book in which they write about one thing they have learned and include any questions they have about what they are learning. The teacher gathers in the Thinking Books each day and writes questions and comments in response to the Thinking Book entry. Swan and White found that students found it easy to write about what they had done, but much harder to focus on what they had learned. Children are encouraged to link their new learning to their prior experiences and knowledge. Swan and White found that some students persistently resisted ever

420 Nuthall, G. (1999). Learning how to learn: The evolution of students' minds through the social processes and culture of the classroom. *International Journal of Educational Research*, 31(3), 139-256.

421 Bennett, N. & Desforges, C. (1985). *Recent advances in classroom research*. Edinburgh: Scottish Academic Press.

422 Bennett, N., Desforges, C., Cockburn, A. & Wilkinson, B. (1984). *The quality of pupil learning experiences*. London, UK: Lawrence Erlbaum Associates.

423 Alton-Lee (1984).

424 Dunkel Perry, C. (1999). Oral communication. In G. Cawelti (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

425 Biddulph, F., & Osborne, R. (Eds.). (1984). *Making sense of our world: an interactive teaching approach handbook. Working Paper No. 122*. Science Education Research Unit. Hamilton: University of Waikato.

426 Gabel, D. (1999). Science. In G. Cawelti (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

427 Swan, S., & White, R. (1994). *The thinking books*. London: Falmer Press.

making connections to their experiences because they perceived these to be unrelated to the world of school work. Swan and White trace links between the students' experiences and orientations to learning and their developmental progress using the Thinking Books, and show the deepening of student thinking and understanding through this dialogic process with the teacher.

Advance organisers that invoke student metacognition have long been shown to assist student achievement across the curriculum (e.g. Walberg, 1999)⁴²⁸ and have been shown to be particularly effective in science instruction. Minstrell and Kraus (2001)⁴²⁹ report that expert physical science teachers ask elicitation questions at the outset of a unit. Students report not liking these elicitation questions before instruction, but value the activity because it helps them to understand the kinds of issues they need to come to grips with. They report that it helps them focus on the goals for learning from the outset.

One of the reasons for the substantial and sustained impact on learning outcomes of pedagogical approaches that teach metacognitive strategies is that they are enabling for diverse learners, particularly learners whose home experiences have emphasised a compliance culture of some kind. Metacognitive strategy instruction is a fast way into the culture of school learning, and higher achievement. Metacognitive strategies make the way to learn transparent to students, and optimise students' agency in their own learning at school. By making such strategies explicit and teaching them, teachers do not just advantage children whose home experiences easily equip them for school learning but rather enable all children to make significant gains.

The evidence for students with disabilities demonstrates the particular importance of explicit teaching to support these students in self-determination, self-regulation and metacognitive strategies. Swanson's (2000)⁴³⁰ meta-analysis revealed higher effect sizes for the efficacy of strategy instruction (along with direct instructional approaches) for students with learning disabilities. Strategy instruction in Swanson's meta-analysis included a range of approaches including think-aloud models, strategy cues, metacognitive strategies, and self-instruction models. When strategy instruction was combined with direct instruction (attention to sequencing, scaffolding, controlling of task difficulty through prompts and cues, opportunities for practice, teacher-modelling of problem-solving steps) then the effect size was substantial (.84). A recent review by Algozzine, Browder, Karvonen, Test and Wood (2001)⁴³¹ of 51 intervention studies reported evidence of positive effects for self-determination across a range of skills (for example: decision-making, self-efficacy, problem-solving, goal-setting, self-advocacy, self-awareness, self-evaluation). These reviewers found available research to most frequently illustrate ways of teaching choice-making to students with moderate and severe disabilities, and ways of teaching self-advocacy to students with learning disabilities or mild mental retardation (Algozzine, Browder, Karvonen, Test & Wood, 2001)⁴³².

While the underlying generic principle is about developing students' capabilities as effective learners, the evidence-based strategies emerging from the research suggest the importance of ensuring the approaches are used in ways that support specific curricular goals. This finding has also been evident in the research on students with special needs. Effect sizes for interventions focussed on cognitive and metacognitive strategies were higher when embedded within curricular domains, rather than taught as isolated skills, in the findings of Swanson, Carson and Saches-Lee's (1996)⁴³³ synthesis of evidence for students with learning disabilities.

428 Walberg, H. (1999). In G. Cawelti (Ed.), *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

429 Minstrell, J., & Kraus, P. (2001). The teaching and learning of physics. In J. Brophy, (2001), (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching*. Vol. 8. New York: Elsevier.

430 Swanson, H.L. (2000). What instruction works for students with learning disabilities? Summarising the results from a meta-analysis of intervention studies. In R. Gersten, E. Schiller & S. Vaughn (Eds.), *Contemporary special education research: Syntheses of the knowledge base on critical instructional issues*. New Jersey: Lawrence Erlbaum Associates.

431 Algozzine, B., Browder, D., Karvonen, M., Test, D.W., & Wood, W.M. (2001). Effects of interventions to promote self-determination for individuals with disabilities. *Review of Educational Research*, 71(2). 219-278.

432 Algozzine, B., Browder, D., Karvonen, M., Test, D.W., & Wood, W.M. (2001). Effects of interventions to promote self-determination for individuals with disabilities. *Review of Educational Research*, 71(2). 219-278.

433 Swanson, H., Carson, C., & Saches-Lee, C.M. (1996). A selective synthesis of intervention research for students with learning disabilities. *School Psychology Review*, 25(3), 370-391.

Pedagogy that supports students' self-regulation, personal goal setting and decision-making has been found to be particularly important where behavioural change is the desired outcome as in health (for example, healthy eating or stopping smoking). Sawyer (1999)⁴³⁴ emphasises the importance of a pedagogy that takes account of students' values and beliefs as well as their knowledge in supporting self-regulation in health.

With reference to reading comprehension, Palincsar and Brown (1989)⁴³⁵ defined the self-regulated learner as one who:

...possesses and is able to use, in a flexible way, three types of knowledge: (1) knowledge of strategies as heuristics that enable one to accomplish learning tasks efficiently; (2) knowledge of one's own learner characteristics as well as knowledge of the task demands one confronts, often called metacognition; and (3) knowledge of the content or the factual knowledge that one possesses about specific domains as well as the world' (p. 39)

Palincsar and Brown (1989) described their model of reciprocal teaching developed over a number of years in primary and secondary contexts. Teachers and students take turns in leading discussions about shared texts. The reciprocal teaching model begins with four scripted activities that are taught as strategies: predicting, questioning, summarising and clarifying. The teacher begins by instructing, explaining and modelling the approach, then gradually turns over more and more control to students, as they become proficient with the strategies. The evaluations of this approach showed marked improvement in students' abilities to summarise, generate questions, clarify and predict from text and 'quantitative improvements on comprehension measures were large, reliable and durable'. (p. 45).

Teaching students strategies to enable a metacognitive approach to curriculum engagement has been found to be one of the strongest approaches to influence learning outcomes. The simple and potentially cross-curricular metacognitive strategy that showed the highest effect size (1.61) of any single classroom variable linked to learning outcomes in Marzano, Pickering and Pollock's (2001)⁴³⁶ meta-analysis, was 'identifying similarities and differences'. Elsewhere in this synthesis the risks of mis-aligning such a powerful strategy with curricula goals in social studies have been highlighted. Notwithstanding that caution, such a powerful effect size indicates the importance of this kind of metacognitive strategy in supporting student learning.

The explicit use of metacognitive approaches has been a feature of the Numeracy Initiative in New Zealand. A key finding of the Count Me In Too evaluation has been the critical role of strategy teaching in lifting student achievement. Higgins (2001)⁴³⁷ reported that the shift in emphasis on mental strategies impacted on types of mathematics equipment used, ways the equipment was used, and greater emphasis on questioning and students' explanations. All were linked to student gains. In exemplifying the shift, Higgins reported:

What comes through is the shift for these two teachers from a focus on the answer to an emphasis on the thinking process that students use to arrive at the answer. Both these teachers suggest that students should be taught how to think mathematically. (p.27).

The strategies mentioned included the children counting on using their fingers and mentally in their heads; chunking numbers and looking for groups; and repeated addition. This focus on strategies signalled an interest in how children solved problems and how they think about number ...' (p. 29).

434 Sawyer, R. (1999). Health education. In G. Cawelti (Ed.), *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

435 Palincsar, A.S., & Brown, A.L. (1989). Classroom dialogues to promote self-regulated comprehension. In J. Brophy (Ed.), *Advances in research on teaching*. (Vol. 1), pp.35-71.

436 Marzano, R., Pickering, D., & Pollock, J. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Virginia: Association for Supervision and Curriculum Development.

437 Higgins, J. (2001). *An Evaluation of the Year 4 – 6 Numeracy Exploratory Study*. Wellington: Learning Media.

Higgins' evaluation traces a sea change in New Zealand junior teachers' views, from a hands-off perspective on student development (awaiting readiness) to explicit use of strategy teaching and scaffolding of students' engagement with mathematical tasks.

Cardelle-Elawar (1992)⁴³⁸ reports one of many studies that have found explicit metacognitive instruction to lift the achievement of low-achieving students, in this case in mathematics with 12-year-old Hispanic students. The students make significant progress in understanding how to approach a problem, identifying the appropriate schema for organising the information, recognising that there may be more than one way of solving the problem, and verifying their solutions. The findings emphasised the need for teachers to focus specifically on the strengths and weaknesses of student learning behaviour, rather than deficit attributions. Effective pedagogical strategies included creating an environment where errors and mistakes led to positive feedback and direction, where task structure was carefully planned, paced and scaffolded, where teacher-student interaction was optimised, and where student reflection was built into task requirements.

The strategy of 'generating and testing hypotheses' was eighth of the nine key instructional variables that influence student achievement in Marzano, Pickering and Pollock's (2001)⁴³⁹ meta-analysis. This finding reflects also the prominence of research in metacognition in science education. For example, Wandersee (2001)⁴⁴⁰ identifies the effective role that metacognitive tools can play in biology education, because they assist students to monitor their own understanding of biological ideas and engage in formative assessment of their own progress. He includes concept maps, flow charts, semantic networks, Vee diagrams (diagrams used to represent how scientists come to know something via inquiry) and student self-constructed graphics, as providing visible constructions that assist both students and teachers to be diagnostic in monitoring progress against goals.

Minstrell and Kraus (2001)⁴⁴¹ reviewed research about the effectiveness of the 'Thinker Tools' curriculum designed to help middle school students build conceptual understandings of force and motion. After each activity, students assess their own performance on one of a set of criteria. Then they are asked to justify their self-assessment. Not only did the process of self-assessment help deepen students' understandings (particularly for low achievers) but, the better the students were at justifying their self-assessment scores, the higher their performance on the final research projects.

The Project for Enhancing Effective Learning (PEEL) is a longstanding Australian teaching approach, the goal of which is to enable students to become purposeful managers of their own learning in science (Baird & White, 1982⁴⁴²; White, 2001⁴⁴³; White, 2001a⁴⁴⁴). The teachers and researchers concerned argue that it is not easy to measure meta-learning so they have focused instead on good learning behaviours as indicators that teaching is supporting students to be managers of their own learning. Examples of these behaviours are: tells teacher when does not understand; checks work against instruction, correcting errors and omissions; when stuck, refers to earlier work before talking to teacher; plans a general strategy before starting; checks teacher's work for errors, offers corrections. White cites evidence that the PEEL approach has now become embedded in the work of the PEEL teachers rather than being a transitory intervention.

438 Cardelle-Elawar, M. (1992). Effects of teaching metacognitive skills to students with low mathematics ability. *Teaching and Teacher Education*, 8(2), 109-121.

439 Marzano, R., Pickering, D., & Pollock, J. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Virginia: Association for Supervision and Curriculum Development.

440 Wandersee, J.H. (2001). High school biology instruction: Targeting deeper understanding for biological literacy. In J. Brophy, (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8*. New York: Elsevier.

441 Minstrell, J., & Kraus, P. (2001). The teaching and learning of physics. In J. Brophy, (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8*. New York: Elsevier.

442 Baird, J.R., & White, R.T. (1982). Promoting self-control of learning. *Instructional Science*, 11, 227-247.

443 White, R. (2001). Transforming teaching: The Project for Enhancing Effective Learning. *Unterrichtswissenschaft Zeitschrift für Lernforschung*, 3, 213-223.

444 White, R. (2001). The revolution in research on science teaching. In V. Richardson (Ed.), *Handbook of Research on Teaching (Fourth Edition)*. Washington D.C: American Educational Research Association.

Quality teaching facilitates thoughtful student discourse: Questions are planned to engage students in sustained discourse structured around powerful ideas

Hattie (1999)⁴⁴⁵ reported meta-analyses that show teacher questioning to have a positive effect size of .41 on student achievement outcomes. Research shows that where such questioning promotes thoughtful and sustained discourse, the effects are likely to be substantially greater. These findings apply across many areas of the curriculum. An important finding in the research has been the importance of scaffolding questioning to support and generate higher order thinking. Low level and factual questions often provide better scaffolds for students to achieve higher order thinking than higher order or open questions. Higher order or open questions can confuse students, particularly students who do not bring the cultural capital of the school to their activities, and leave them without the metacognitive tools or information about question genre to achieve sustained thoughtfulness (for example: Medley, 1979⁴⁴⁶; Stallings & Kaskowitz, 1974⁴⁴⁷, and Wright & Nuthall, 1970⁴⁴⁸).

Higgins (2001)⁴⁴⁹ reports teachers participating in the Year 4 numeracy exploratory study professional development programme placing much greater emphasis on questioning and students' explanations. The programme assisted teachers to move away from the use of questions to elicit brief responses towards the use of questions to develop strategic thinking in students.

Anthony and Knight (1999)⁴⁵⁰ report that New Zealand teachers of Years 4 and 5 students ranked⁴⁵¹ a 'Think Board' as the one of many classroom tasks and resources that most promoted understanding and remembering in students. The Think Board is a large piece of card divided into four sections labelled Symbols, Pictures, Stories and Real Things. Four students sit around the board. The teacher asks them to translate equations into stories, pictures, symbols, or to use real things. The activity strengthens understanding in a range of ways. For example, it enables students to make connections between different representations and to develop a range of mathematical strategies.

Torney-Purta, Hahn and Amadeo (2001)⁴⁵² reviewed analyses from the International Education Association (IEA) Civic Education Studies carried out across 28 countries. They found being in a classroom where the teacher encouraged students to express opinions, where patriotic rituals were infrequent, and where worksheets were infrequently used, were predictive of high achievement. Torney-Purta, Hahn and Amadeo reviewed a range of studies that found:

An open classroom atmosphere in which students report frequently discussing issues, hearing and exploring alternative views, and feeling comfortable expressing their own opinions has been found to be associated with participatory attitudes (to democratic participation in later life) as well as with knowledge ... However, the mere presence of public issues about which there is controversy is insufficient. Indeed when they are presented in a closed climate in which only one view is presented and/or in which students do not feel comfortable expressing their views, lower levels of political efficacy, participation and citizen duty are likely to result. (p.389).

These reviewers emphasised the importance of combining issues-centred instruction, with authentic links to student community, to thoughtful discourse, in order to ensure influence on students' attitudes as well as knowledge outcomes.

445 Hattie, J. (April, 1999). *Influences on student learning*. Inaugural lecture, University of Auckland, New Zealand.

446 Medley, D.M. (1979). The effectiveness of teachers. In P. L. Peterson & J. H. Walberg (Eds.), *Research on teaching: Concepts, findings and implications*. Berkeley: McCutchan.

447 Stallings, J., & Kaskowitz, D. (1974). *Follow through classroom observation evaluation 1972-73. (SRI Project Report No. URU-7370)*. Stanford, California: Stanford Research Institute.

448 Wright, C., & Nuthall, G. (1970). Relationships between teacher behaviours and pupil achievement in three experimental elementary science lessons. *American Educational Research Journal*, 7, 477-491.

449 Higgins, J. (2001). *An Evaluation of the Year 4 – 6 Numeracy Exploratory Study*. Wellington: Learning Media.

450 Anthony, G., & Knight, G. (1999). *Teaching for understanding and memory in Year 4 and 5 mathematics*. A report prepared for the Ministry of Education. Massey University: Institute of Fundamental Sciences.

451 Although student gains in achievement were not reported specifically, the teacher rankings were founded in their own action research studies of changes in student achievement.

452 Torney-Purta, J., Hahn, C., & Amadeo, J. (2001). Principles of subject-specific instruction in education for citizenship. In J. Brophy, (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching*. Vol. 8. New York: Elsevier.

In their review of research in mathematics linked to achievement, Grouws and Cebulla (1999)⁴⁵³ concluded that: 'Teaching that incorporates students' intuitive solution methods can increase student learning, especially when combined with opportunities for student interaction and discussion' (p.19). They report that this finding has been apparent in a range of U.S. research but has been highlighted in the results of the recent TIMSS video study that has shown the use of student solution methods extensively in Japanese classrooms. Doyle (1983)⁴⁵⁴, in his overview of research, called for a strong role for the teacher when supporting student invention opportunities. On the basis of his review of observational classroom research studies Doyle (1983) warned that when there is insufficient teacher vigilance, students can invent their own 'buggy algorithms' that lead to practising and consolidating flawed understandings in mathematics.

In summary, sustained higher achievement is possible when teachers use pedagogical approaches that enable students to take charge of their own learning. Such approaches do not leave the students 'to discover' in an unstructured environment. Rather, they are highly structured in supporting student agency and sustained and thoughtful engagement. For example, they foster students' abilities to define their own learning goals, ask questions, anticipate the structure of curriculum experiences, use metacognitive strategies when engaging with curriculum, and self-monitor. Pedagogies that emphasise, embed and enable metacognitive strategy-use throughout curriculum engagement for class groupings, are associated with much higher achievement and enable marked improvements for low achievers.

453 Grouws, D.A., & Cebulla, K. J. (1999). *Improving student achievement in mathematics. Educational Practice Series-4*. Lausanne: Unesco, International Academy of Education.

454 Doyle, W. (1983). Academic work. *Review of Educational Research*, 53, 159-199.

(X) Teachers and Students Engage Constructively in Goal-Oriented Assessment

Research-based characteristics

- Assessment practices improve learning
- Teachers and students have clear information about learning outcomes.
- Students have a strong sense of involvement in the process of setting specific learning goals.
- Pedagogy scaffolds and provides appropriate feedback on students' task engagement.
- Teachers ensure that their assessment practices impact positively on students' motivation.
- Teachers manage evaluative climate, particularly in the context of public discussion, so that student covert or overt participation is supported, scaffolded and challenged without students being humiliated.
- Teachers manage evaluative climate so that academic norms are not undermined but are supported by social norms.
- Teachers adjust their teaching to take account of the results of assessment.

Assessment to Improve Learning

The evidence suggests that when assessment takes the form of effective and formative feedback it is one of the most influential elements of quality teaching. Brophy (2001)⁴⁵⁵ included feedback as one of the key teaching influences on learning outcomes:

Students need sufficient opportunities to practice and apply what they are learning; and to receive improvement-oriented feedback. (p.14).

Hattie (1999)⁴⁵⁶ described feedback (reinforcement) to be the single most powerful moderator of student achievement across all variables he has considered in his meta-analyses (with an effect size of 1.13). Hattie broke the general category of feedback into sub-categories and found the effect sizes as follows: reinforcement (1.13), corrective feedback (.94), remediation and feedback (.65), diagnostic feedback (.52), and mastery learning (.50). Although feedback showed the highest effect size in Hattie's comparisons, it is noteworthy that assessment effectiveness is embedded within and dependent upon pedagogical context - assessment and feedback alone do not achieve the effect. Marzano, Pickering and Pollock (2001)⁴⁵⁷ found an effect size of .80 for 'reinforcing effort and providing recognition'. Their meta-analysis ranked this variable as the third most powerful influence on student learning.

In the New Zealand context, Bell and Cowie (1997)⁴⁵⁸ observed formative assessment in Year 7-10 science classrooms, although the research design did not link characteristics of formative assessment to learning outcomes. They found both planned (for example, the use of brainstorm) and interactive formative assessment to be used. Bell and Cowie (1997) perceived interactive formative assessment to be a skilled and complex teacher activity. These researchers identified seven characteristics of teacher knowledge needed to provide responsive formative assessment:

- (a) content knowledge in the curriculum area,
- (b) general pedagogical knowledge,
- (c) curriculum knowledge,
- (d) pedagogical content knowledge appropriate to the learners,
- (e) knowledge about the learner,
- (f) knowledge of educational contexts, and
- (g) a knowledge of educational aims and purposes (including the desired outcomes).

455 Brophy, J. (2001). (Ed). *Subject-specific instructional methods and activities. Advances in Research on Teaching. Vol. 8.* New York: Elsevier.

456 Hattie, J. (April, 1999). *Influences on student learning. Inaugural lecture*, University of Auckland, New Zealand.

457 Marzano, R., Pickering, D., & Pollock, J. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement.* Virginia: Association for Supervision and Curriculum Development.

458 Bell, B., & Cowie, B. (1997). *Formative assessment and science education: Summary report of the Learning in Science Project (assessment).* Hamilton: University of Waikato, Centre for Science, Mathematics, Technology Education Research.

New Zealand research about the provision of reinforcement in the form of positive evaluations has found provision to vary by instructional language setting. In their observational study across eight New Zealand schools, Carkeek, Davies and Irwin (1994)⁴⁵⁹ found Māori students to get far more positive evaluations in immersion programmes than in bilingual or mainstream programmes (see Table 2). This different quality of instructional experience observed is particularly significant in the light of the significantly higher performance of students in Māori immersion than students in either mainstream or bilingual units in School Certificate and sixth form examination grades⁴⁶⁰.

Table 2: Mean Frequency of Positive Evaluations in Different Instructional Language Settings (Carkeek, Davies, and Irwin, 1994)

	Mean Frequency of Positive Evaluations	
Instructional Language Setting	Māori Girls	Māori Boys
Immersion	3.4	3.1
Bilingual	1.5	2.1
Mainstream	1.6	1.7

Carkeek, Davies, and Irwin (1994) found the frequency of negative evaluations for Māori boys to be relatively high in mainstream English medium classes. Black and Wiliam (1998)⁴⁶¹ and Doyle (1983)⁴⁶² reported findings about the negative impact on students of inappropriate use of assessment feedback and/or negative evaluations. These reviewers found that when the classroom culture sends a message to students that the goal is to get the 'right answer' rather than to develop genuine understanding, then they can learn to circumvent intellectual engagement with tasks and find short cuts to manage classroom demands. In other words, inappropriate assessment practices can 'teach' students to circumvent sustained thoughtfulness.

In her overview of research linked to achievement in oral communication, Dunkle Perry (1999)⁴⁶³ identifies oral communication as a key area where teachers can inadvertently exacerbate oral communication anxiety, and where insensitive public evaluations can actually undermine student achievement. She points out that the research indicates teachers should pro-actively use a range of strategies to minimise oral communication anxiety.

When students do not receive sufficient scaffolding and resources to succeed in class, getting negative feedback about their performance can have serious implications:

Many are reluctant to ask questions out of fear of failure. Pupils who encounter difficulties and poor results are led to believe that they lack ability, and this belief leads them to attribute their difficulties to a defect in themselves about which they cannot do a great deal. So they 'retire hurt', avoid investing effort in learning which could only lead to disappointment, and try to build up their self-esteem in other ways. Whilst the high achievers can do well in such a culture, the overall result is to enhance the frequency and the extent of under-achievement' (Black & Wiliam, 1999, p. 9)⁴⁶⁴

There is a substantial research literature documenting the alternative cultural values (for example, 'Cool to act the fool') that boys, in particular, can foster when disaffected by the teaching and learning

459 Carkeek, L., Davies, L., & Irwin, K. (1994). *What happens to Māori girls at school? An ethnographic study of the school-based factors affecting the achievement of Māori girls in immersion, bilingual, and mainstream primary school programmes in the Wellington Region*. Final Report to the Ministry of Education. Wellington: Ministry of Education.

460 Minister of Education. (2001). *New Zealand Schools Nga Kura o Aotearoa: A report on the compulsory school sector in New Zealand 2000*. Wellington: Ministry of Education.

461 Black, P., & Wiliam, D. (1998). *Inside the black box: Raising standards through classroom assessment*. London: King's College, School of Education.

462 Doyle, W. (1983). Academic work. *Review of Educational Research*, 53, 159-199.

463 Dunkle Perry, C. (1999). Oral communication. In G. Cawelti (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

464 Black, P., & Wiliam, D. (1998). *Ibid.*

process or seeking to be macho when macho is seen as inconsistent with a learning role (Alton-Lee & Praat, 2000)⁴⁶⁵. In such cases social norms of peer group sub-cultures can subvert academic norms.

Assessment is a powerful tool for optimising or inhibiting learning. The degree to which a teacher is skilled in scaffolding learning and providing effective and constructive formative assessment is accordingly a key factor in the teacher's capability to provide quality teaching for diverse students. Brophy (1983)⁴⁶⁶ found achievement to be far higher when students are enabled to get high rates of success in answering questions and responding to task demands.

In a review of more than 240 studies on the impact of assessment on students' classroom learning and assessment, Crooks (1988)⁴⁶⁷ found that for assessment to improve learning, students need:

- to be offered clear learning outcomes
- specific, constructive and regular feedback
- a strong sense of involvement in the assessment process, and
- the opportunity to set and achieve specific learning goals.

Black and Wiliam (1998a⁴⁶⁸; 1998b)⁴⁶⁹ built on this study and reviewed 250 major studies between 1988 and 1998 on the links between assessment and learning. They found that, in order to improve learning, students need:

- effective feedback (not just feedback that serves social and managerial purposes)
- to be actively involved in their own learning and assessment
- teachers who adjust their teaching to take account of the results of assessment (teachers need to know about progressions and students' learning needs)
- teachers who ensure that assessment practices impact positively on students' motivation.

In her review, Sawyer (1999)⁴⁷⁰ found student active involvement in goal setting to be related to good outcomes in health education. She emphasised the importance of explicit instruction and practice opportunities to enhance students' goal-setting skills.

Teachers adjust their teaching to take account of the results of assessment.

Assessment can not only improve learning, it can also improve teaching - or not. In the wider professional development programme associated with the 'Picking up the Pace' study reported previously, Phillips, McNaughton and McDonald (2001)⁴⁷¹ found that New Zealand literacy teachers had not been adjusting their teaching to take account of the results of assessment; rather they had been explaining the discrepancies with national benchmarks as outcomes of deficiencies in the children or their families and communities.

A professional development intervention focussed on the interpretation and use of the assessment data was used to enable the teachers to use the information to adjust their teaching to the students' needs. The outcome showed this approach to professional development to be particularly effective in improving the quality of the teaching. McNaughton (2002)⁴⁷² reported the impact of the programme in terms of the reduced risk of students not meeting benchmark standards:

It showed that major reductions in the level of risk had been achieved by the seventy-seven teachers in the twelve schools. (p. 214)

465 Alton-Lee, A., & Praat, A. (2000). *Explaining and addressing gender differences in the compulsory school sector: A literature review 1989-1999*. Wellington: Ministry of Education.

466 Brophy, J. (1983). Classroom organisation and management. *The Elementary School Journal*, 82: 266-85.

467 Crooks, T. J. (1988). The impact of classroom evaluation practices on students. *Review of Educational Research*, 58(4), 438-481.

468 Black, P., & Wiliam, D. (1998). *Inside the black box: Raising standards through classroom assessment*. London: King's College, School of Education.

469 Black, P. & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education*, 5(1), 7-74.

470 Sawyer, R. G. (1999). Health education. In G. Cawelti (Ed.). *Handbook of research on improving student achievement (Second Edition)*. Virginia: Educational Research Service.

471 Phillips, G., McNaughton, S., & MacDonald, S. (2001). *Picking up the pace: Effective literacy interventions for accelerated progress over the transition into decile 1 schools*. Final report to the Ministry of Education. Auckland: The Child Literacy Foundation and the Woolf Fisher Research Centre.

472 McNaughton, S. (2002). *Meeting of minds*. Wellington: Learning Media.

In summary, the evidence shows the role of effective feedback as formative assessment to be one of the strongest influences on student learning. This aspect of quality teaching draws on multiple teacher knowledges and expertise and is particularly important for the learning and achievement of diverse students. New Zealand research has shown positive feedback frequencies to vary markedly between Māori medium and English medium settings for Māori students. Negative evaluations or feedback without scaffolding to resource and support student learning can have a negative impact on students' motivation and engagement, and contribute to student disaffection. Effective teachers actively involve students in their own learning and assessment, make learning outcomes transparent to students, offer specific, constructive and regular feedback, and ensure that assessment practices impact positively on students' motivation. Assessment can improve teaching and learning when teachers adjust their teaching to take account of the results of assessment.

8. Summary

Quality teaching is identified as the key system influence on high quality outcomes for diverse students. The evidence reveals that up to 59% or even more of variance in student performance is attributable to differences between teachers and classes, while up to almost 21% (although generally less) has been found to be attributable to school level variables. A summary of the evidence about what is quality teaching and what works for diverse students follows.

Quality teaching is focused on student achievement (including social outcomes) and facilitates high standards of student outcomes for heterogeneous groups of students.

Quality teaching has a central focus on raising student achievement for diverse learners. New Zealand educators need to break a pattern of inappropriately low expectations for some students, particularly Māori and Pasifika learners and learners from low socio-economic status families. The research on quality teaching signals the importance of high expectations both for the standards that can be reached, and the pace at which learning should proceed. High expectations are necessary but not sufficient, and can be counterproductive, when not supported by quality teaching. External benchmarks, assessment and, in particular, effective diagnostic and formative assessment can play a key, and necessary, but not sufficient role in supporting high achievement for diverse learners. Evidence about achievement is also critical to counter ineffective approaches (for example, inappropriately stereotyping students as kinaesthetic learners and targeting such students with less effective instructional opportunities). Such findings emphasise the importance of attending to the research evidence linked to student achievement (and social outcomes), and developing our knowledge of the kinds of pedagogical approaches that research reveals to be facilitative of the learning of heterogeneous groups of students.

Pedagogical practices enable classes and other learning groupings to work as caring, inclusive and cohesive learning communities.

Learning communities provide environments that facilitate achievement. The term 'learning community' denotes an unrelenting focus⁴⁷³ on, and active orientation to, learning and describes the kind of classroom where community building supports academic and social outcomes. The peer culture has been developed by the teacher to support the learning of each member of the community. The teachers has a key role to play in creating a community that does not generate 'us' and 'other' distinctions, but includes all of 'us' whatever our cultural or other identity, who are part of our community. Diversity is valued, addressed and integral to instructional strategies. Caring and support is integrated into pedagogy and evident in the practices of teachers and students.

473 Hopkins, D. (2001). *School improvement for real*. London: Routledge.

In a learning community, academic norms are strong and not subverted by social norms. Students are enabled to express and process dissenting views. Disagreements around curriculum are valued and cognitive conflict is seen as a resource central to the learning process. A learning community is neither stymied by a 'culture of niceness' that impedes learning nor undermined by peer abuse and intimidation. Teachers play a central role in training students in strategies to ensure social norms support rather than subvert academic norms, both through direct instruction and through the structuring of the academic and task environment.

The research showing the interdependence of the social and the academic is not confined to better outcomes for particular curriculum areas, class levels or particular groups of students. This synthesis has provided evidence for learning disabled, low, high and gifted achievers. There is strong evidence of the positive impact of teacher and student development of effective learning communities, not just for some learners, but across the range of diverse learners, and for heterogeneous groupings of learners.

Effective links are created between school and other cultural contexts in which students are socialised to facilitate learning.

Teachers need to ensure that student experiences of instruction have known relationships to other cultural contexts in which the students are socialised. Students come from many different communities and the classroom culture is in itself a new learning experience. Students need the culture of the classroom made explicit to them (e.g. the meaning of hand-raising, how to access information, what being asked for an answer, using a text or generating a product means, and how to respond within a genre). Students need to have the relevance of their learning activities made transparent.

Associative link-making to students' prior experiences and knowledge is fundamental to the learning process and one of the recurrent and strongest findings in research on teaching. Many of the evidence-based findings referenced in the body of this synthesis (e.g. wait-time, use of diagrams, instructional dialogues) are pedagogical strategies that give diverse learners opportunities to make associative links. When academic norms are central to learning community, and teachers are able to provide the time, prompts and opportunities for diverse learners to make such links as a matter of course, then teaching is likely to be highly effective. Such approaches optimise the metacognitive gains that diverse links and different experiences can offer, and teachers can both raise achievement and reduce disparity in achievement outcomes.

Quality teaching effects are maximised when supported by effective school-home partnership practices focused on student learning. The nature of parental or caregiver involvement in their children's education is crucial to improved outcomes. Partnerships that align school and home practices and enable parents to actively support their children's in-school learning have shown some of the strongest impact on student outcomes, especially in literacy and health and physical education. Such partnerships can provide a particularly cost-effective approach to supporting the learning of diverse students. Effective homework shows strong impacts on student achievement, particularly at secondary level. But the findings for homework are markedly variable, and even negative in some cases, reflecting to some extent varying teacher ability to construct, resource and scaffold appropriate homework tasks for diverse students.

Teaching is responsive to student learning processes

Our strongest evidence of the potential for higher achievement for diverse students arises out of a range of classroom research programmes that make student learning processes and understandings transparent, and make explicit the kinds of teaching practices and approaches that support student learning processes. What is notable about these responsive teaching approaches is that they bring together, into coherent pedagogies, many of the characteristics of quality teaching identified across the international research. In cases where there has been specific provision of professional development in such approaches in New Zealand, with associated monitoring of student learning, there has been evidence of marked improvement in student outcomes. Teacher responsiveness to student learning processes is particularly critical for students with special needs.

Opportunity to learn is effective and sufficient

There is a long research history demonstrating that time is necessary for learning to occur. However, outcomes-linked research indicates that what appears to be opportunity to learn may be unproductive busy work in classrooms. Classroom management practices focused on discipline, compliance, presentation of work and quiet engagement may actually counter the kinds of opportunities that facilitate sustained learning. The evidence suggests that teachers need to marshal classroom management practices to support learning. Productive opportunity to learn is constrained by the nature of students' memory and learning processes. Teachers can optimise opportunity to learn by designing tasks to challenge student misconceptions and providing structured opportunities to enable students to resolve cognitive conflicts. Teachers can optimise learning opportunities for diverse students by complementing language use with multiple opportunities for students to have access to, generate and use, non-linguistic representations such as diagrams. For opportunity to learn to be sufficient to facilitate long-term learning, students need curriculum-appropriate opportunities to practice and apply their new learning. Out-of-school opportunities for authentic applications can have significant and sustained impacts on student knowledge, attitudes, self-esteem, independence and confidence.

Multiple task contexts support learning cycles

The evidence shows how the range, sequences and interdependencies of task contexts can influence student achievement. A skilled teacher optimises task sequences, not only to directly facilitate the different stages of learning cycles for individual students, but also to build up a peer learning culture that can intensify the challenges and supports for learning.

Curriculum goals, resources including ICT usage, task design and teaching are effectively aligned.

The significance of pedagogical alignment is emerging across the curricular areas, and particularly in the context of ICT. This principle of alignment explains why 'add-ons' imposed upon curriculum, and conflicting interventions, can be ineffective or even counterproductive for students. These findings not only emphasise the instrumental and integrative role of the teacher in aligning resources, equipment, ICT, curriculum and teaching, but also that of school leadership in supporting and resourcing coherent programmes.

Quality teaching is optimised when there is whole school alignment. Despite the relatively high impact of classroom teaching compared with school effect on student outcome, the principle of whole school alignment is emerging as having a value-added effect on outcomes for diverse students, particularly social outcomes. Whole school alignment can enhance the focus on achievement, optimise inclusion (rather than exclusion) across the daily experiences of diverse students, and increase opportunity to learn, particularly in language immersion, literacy, ICT, social studies, and health education. Whole school alignment can optimise collaboration and provide processes to support, resource and sustain quality teaching.

Pedagogy scaffolds and provides appropriate feedback on students' task engagement.

There is substantial evidence of the key role played in achieving higher outcomes for diverse students through effective scaffolding - the process by which teachers challenge and enable students to move beyond what they can do independently by providing structured assistance. Such scaffolds and resources are built into task design, teacher-student and peer interactions. Effective scaffolding practices have played a key role in teaching approaches that have shown the most marked gains for low achievers. Scaffolding is the process not only by which students learn, but also the process whereby they internalise independent learning strategies that are made transparent to them through experiences of being scaffolded by others. Skilled teaching builds care and respect into the learning process through the use of positive scaffolding practices that enable students to succeed. Effective feedback is one of the strongest influences on student outcomes and is a key aspect of the scaffolding process.

Pedagogy promotes thoughtful learning orientations, student self-regulation, metacognitive strategies and thoughtful student discourse

Sustained higher achievement is possible when teachers use pedagogical approaches that enable students to take charge of their own learning. Such approaches do not leave the students 'to discover' in an unstructured environment. Rather, they are highly structured in supporting student agency and sustained and thoughtful engagement. For example, they foster students' abilities to define their own learning goals, ask questions, anticipate the structure of curriculum experiences, use metacognitive strategies when engaging with curriculum, and self-monitor. Pedagogies that emphasise, embed and enable metacognitive strategy-use throughout curriculum engagement for class groupings are associated with much higher achievement and enable marked improvements for low achievers.

Teachers and students engage constructively in goal-oriented assessment.

The evidence shows the role of effective feedback, as formative assessment, to be one of the strongest influences on student learning. This aspect of quality teaching draws on multiple teacher knowledges and expertise and is particularly important for the learning and achievement of diverse students. New Zealand research has shown positive feedback frequencies to vary markedly between Māori medium and English medium settings for Māori students. Negative evaluations or feedback, without scaffolding to resource and support student learning, can have a negative impact on students' motivation and engagement, and contribute to student disaffection. Effective teachers actively involve students in their own learning and assessment, make learning outcomes transparent to students, offer specific, constructive and regular feedback, and ensure that assessment practices impact positively on students' motivation. Assessment can improve teaching and learning when teachers adjust their teaching to take account of the results of assessment.

9. Where to From Here? An Iterative Journey

This best evidence synthesis has brought together evidence about characteristics of teaching that optimise achievement (including social outcomes) for diverse students. The synthesis has drawn upon international and New Zealand research which has included evidence about effective teaching across different curriculum areas and with students of different ages. The synthesis makes evident the central role of teacher creativity and expertise in scaffolding and being responsive to student learning processes. Ten generic characteristics have been derived from the analysis of the research evidence and care has been taken to illustrate, and make transparent, tensions for different curriculum areas and the importance of context.

The summary information from this synthesis is intended to play a constructive role in developing and informing discourses about teaching amongst policy makers, educators, curriculum associations and researchers. This best evidence synthesis is intended to be part of an iterative journey in the project to improve the evidence base for education. Accordingly it needs to be part of, and embedded within a wider consideration of what constitutes quality in different curriculum areas, in curriculum integration, and at different levels of education.

Because context is so important to our understanding of what works, research in the New Zealand context will be particularly important in further syntheses to develop and strengthen this work. There is much work to do to generate a knowledge management system for systematically bringing together the research about teaching and learning that is held in theses and research reports in university libraries or held in research reports by teacher/researchers. It is hoped that this initial synthesis will provide an impetus for dialogue, critique, development, systematic updating and ongoing synthesis work to improve access to evidence about quality teaching across the curricular areas.

In the interim, it is intended that this synthesis will help to strengthen our capability to meet the needs of diverse learners and to enhance the achievement and well-being of all the students in our schools.