



# Focus on Māori Achievement in Reading Literacy

## Results from PISA 2000



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### **OVERVIEW**

Each year around 10,000 Māori students reach school-leaving age having completed some ten years of compulsory schooling. Soon they will need to apply the knowledge and skills they have learned to meet the challenges of adult life, and over time they will need the capacity to build on what has been learned as these challenges change and proliferate. How well prepared are they, and why are some in a better position than others?

Results from the Programme for International Student Assessment (PISA) provide some answers to these questions. The current report first reviews educational outcomes for Māori 15-year-olds drawing on the PISA 2000 study, and then focuses on reading literacy and the factors associated with high achievement among Māori students. By highlighting the differences between high and low achievers within the Māori population, this report should assist in identifying some of the factors associated with success for Māori in education.

### **About the Programme for International Student Assessment**

The first PISA survey was conducted in 2000 across 28 OECD countries including New Zealand. Its primary focus was reading literacy, with mathematical and scientific literacy assessed as minor domains. The study aims to provide reliable internationally comparable measures of educational achievement using a pencil-and-paper based assessment. In New Zealand, the language of assessment is English. As in other countries, New Zealand results are based on a representative sample of secondary school students aged from 15 years 3 months to 16 years 2 months. As most were aged 15 they are generally referred to as 15-year-olds for brevity.

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The term “literacy” is used to signify that PISA examines more than students’ mastery of the school curriculum. It focuses on how well young adults at age 15 are able to apply the knowledge and skills they have learned to meet the challenges they will face in life. This emphasis on what students can do with what they have learned, rather than simply on whether they have learned it, reflects recent trends in the goals and objectives of school curricula. Students’ knowledge is still assessed, but their ability to reflect on and apply that knowledge and experience to real life situations is also examined.

Age 15 is a crucial time to assess the outcomes of the education process. Students are reaching school-leaving age, and their current academic abilities represent the culmination of a decade of compulsory education. PISA provides a gauge of the cumulative impact of all the learning experiences in a country from early childhood up to age 15. Its findings reflect not only the effectiveness of schools, but the effects of all learning, which begins well before school age and continues in both formal and out-of-school settings.

In addition to the content-specific literacy measures, PISA collects data on general outcomes of learning such as the different strategies students use to learn. These have particular relevance in considering whether students are developing the capacity to continue learning throughout life. Part 1 of this report examines both the content-specific and general outcomes of learning for Māori students in PISA. PISA gathers further contextual information on student, family and school-related factors that can help explain differences in student achievement. Part 2 of this report is concerned with the relationships found between these factors and different levels of reading literacy among Māori students.

### **The Cohort of Māori Students in PISA 2000**

The cohort of Māori students surveyed in PISA 2000 began formal education in the late 1980s. While data are limited from that era, it is likely that at age four the majority (perhaps two thirds) were enrolled in early childhood education, with a substantial proportion of these (perhaps a quarter) attending kōhanga reo, the largest service provider for Māori children.

Nearly all of the cohort entered school in 1989/90, as part of the first wave of students destined to be educated entirely under the newly decentralised administration system for schools that came out of the Tomorrow’s Schools reforms. During the primary school years, new curriculum documents were mandated for mathematics (1994), science (1995) and English (1996) whose focus emphasised the attainment of outcomes and incorporated the eight essential cross curricular skills specified in *The New Zealand Curriculum Framework* (Ministry of Education, 1993). By 1997, the final year of primary schooling, approximately 10 percent were enrolled in Māori-medium programmes providing more than half of curriculum instruction in te reo Māori.

Most of the cohort started high school in 1998, and were among the last New Zealand students to participate in a norm referenced qualifications system, before the introduction of the National Certificate of Educational Achievement (NCEA), a standards based approach. In 2000, nearly 90 percent were in Year 11. Approximately two percent were enrolled in Māori-medium programmes providing curriculum instruction predominantly in te reo Māori. These students were included in the sampling frame, but it is not known how many participated in PISA. Some 15-year-olds granted early leaving exemptions will be excluded from the PISA survey.

## 1. EDUCATIONAL OUTCOMES FOR MĀORI IN PISA 2000

PISA measures two types of educational outcome. This section looks first at Māori achievement in the content-specific domains of reading, mathematical and scientific literacy that provide students with knowledge and skills for life. It then examines the general outcomes of education that form the basis of lifelong learning. Achievement in the three literacy domains is viewed from several different perspectives that highlight different aspects of the overall picture. This section draws on Tables 1-5 in the Appendix.

Statistics from the PISA study are **estimates** of national performance based on a sample of students rather than values that could be calculated if every student had answered every question. Consequently there is a degree of uncertainty associated with each result, which is expressed in the Appendix tables through a standard error. Often attention focuses on whether a given value for a particular group is different from a second value for another group, e.g., whether Māori girls perform better than Māori boys, given the degree of uncertainty surrounding the results for each. In this report, the significance tests used to determine if the difference between two values is statistically significant meet  $\alpha=0.05$  (i.e., the 5% level).

The students sampled in PISA can identify with more than one ethnic group. Statistics New Zealand's 1996 hierarchy is applied to assign students to only one ethnic group. Using this hierarchy, ethnicity is prioritised in the following order: Māori, Pasifika, Asian, Other and Pakeha, e.g., if a person identifies as both Māori and Pasifika then they are counted as Māori. The enrolment data collected by the Ministry of Education are not collected on an individual basis as in PISA but at a school level. However, schools use the same hierarchy when reporting the number of students in each ethnic group. Schools' records of student ethnicity are based on either self-identification or identification by a parent or guardian. The proportion of students in the PISA 2000 sample from each ethnic group, based on self-identification, is close to the enrolment figures reported by the Ministry of Education.

### Ethnic Differences in Reading, Mathematical and Scientific Literacy

In 2000, there were around 51,000 15-year-olds enrolled in New Zealand schools. Approximately two thirds (68 percent) were Pakeha, 18 percent Māori, 7 percent Pasifika, and 6 percent Asian. One percent belonged to other ethnic groups.

Reading, mathematical and scientific literacy are defined in Box 1. Across the three domains, a broadly consistent pattern of differences is found in the average achievement levels of the main ethnic groups in PISA. Table 1 shows that in each literacy domain, Pakeha and Asian students tend to do better than Māori and Pasifika students.

Average achievement for Pakeha students in particular is consistently above the OECD mean (the difference is statistically significant in all of the three domains) which, to the extent that it foreshadows the development of a highly skilled workforce, will likely give this group a considerable economic and social advantage in later life.

The average attainment of Asian students is comparable to that of Pakeha students in mathematical literacy, i.e., the difference is not statistically significant. However, in reading and scientific literacy, mean performance for Asian students is significantly lower than it is for Pakeha students, and not statistically different from the OECD mean.

Relative to the OECD mean, Māori students perform better on average in mathematical literacy than in the other domains. Achievement is comparable to the OECD mean in mathematical literacy, i.e., the difference is not statistically significant, but significantly lower than the OECD mean in reading and scientific literacy. Average achievement in all of the three domains is statistically significantly lower for Māori than it is for Pakeha and Asian students.

Average attainment levels for Pasifika students are statistically significantly lower than they are for other ethnic groups, and also lower than the OECD mean, across all of the three PISA domains except scientific literacy, where there is no statistical difference between Pasifika and Māori students.

**Table 1: Average Scale Scores for Reading, Mathematical and Scientific Literacy, from the PISA 2000 Study**

Domain	Pakeha		Asian		Māori		Pasifika		OECD Countries	
	Mean Scale Score	S.E.	Mean Scale Score	S.E.	Mean Scale Score	S.E.	Mean Scale Score	S.E.	Mean Scale Score	S.E.
Reading Literacy	<b>554</b>	(3.0)	<b>513</b>	(7.9)	482	(4.3)	<b>462</b>	(9.4)	<b>500</b>	(0.6)
Mathematical Literacy	<b>557</b>	(3.3)	<b>547</b>	(7.5)	498	(5.4)	<b>471</b>	(10.7)	500	(0.7)
Scientific Literacy	<b>553</b>	(2.6)	<b>517</b>	(9.7)	483	(5.2)	463	(9.5)	<b>500</b>	(0.7)

Results are scaled in each literacy domain so that the OECD mean equals 500 points, with about two thirds of students across OECD countries scoring between 400 and 600 points. The resulting numerical scale scores cannot be compared directly among the three domains.

**Bold** type indicates that the mean scale score is statistically significantly different from the score for Māori in this domain ( $\alpha=0.05$ ).

S.E. = Standard Error.

Gender differences in average reading literacy levels are found within all ethnic groups. Among Māori students, the average level of reading literacy is higher for girls than boys, but in mathematical and scientific literacy average achievement levels for girls and boys are not statistically different. In other ethnic groups the pattern is similar.

### Box 1: Definitions of the Literacy Domains

**Reading literacy** is the ability to understand, use and reflect on written texts in order to achieve one's goals, to develop one's knowledge and potential, and to participate effectively in society.

**Mathematical literacy** is the capacity to identify, understand and engage in mathematics, and to make well founded judgements about the role mathematics plays in an individual's current and future private life, social life with peers and relatives, and life as a constructive, concerned and reflective citizen.

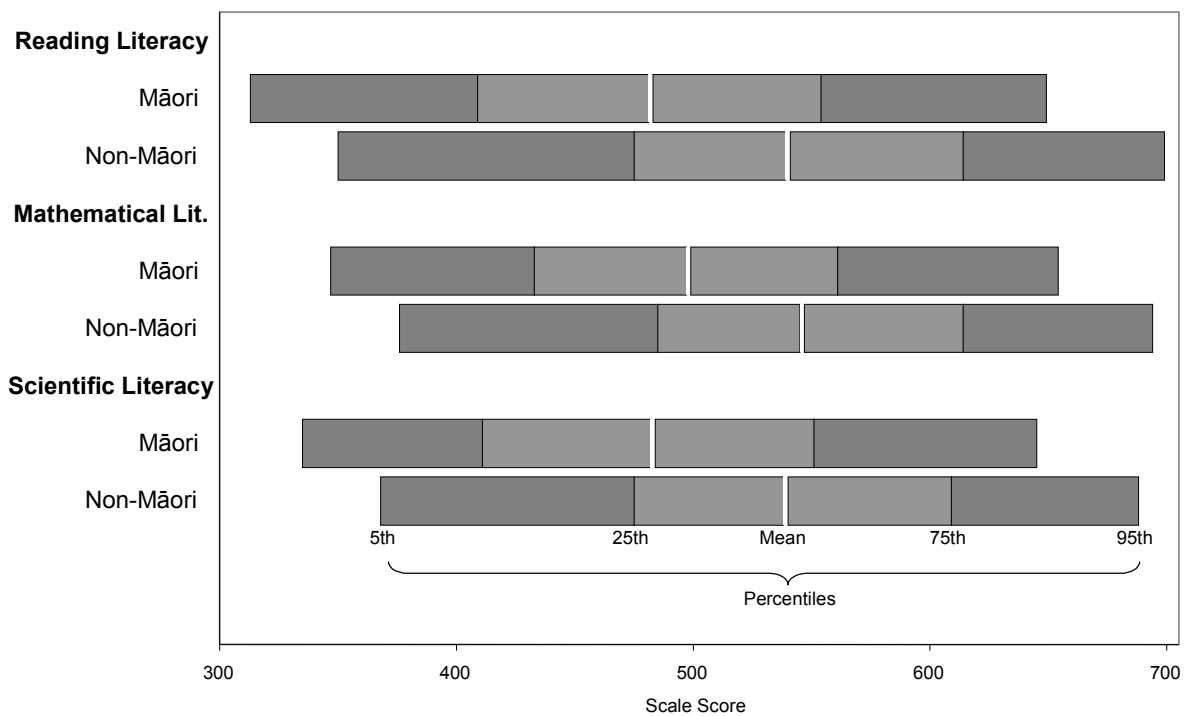
**Scientific literacy** is the capacity to use scientific knowledge, to identify questions, and to draw evidence-based conclusions in order to understand and help make decisions about the natural world and the changes made to it through human activity.

(OECD 2001:21-23)

### Distribution of Literacy among Māori and Non-Māori Students

Average scores are a useful way to summarise differences among ethnic groups. To highlight the range of achievement within the Māori population, this subsection examines the distribution of results for Māori students in PISA. For purposes of comparison, similar distributions are shown for non-Māori students, comprising all other ethnic groups.

In reading literacy, the whole distribution for Māori students is shifted to the left compared to non-Māori students, indicating generally lower achievement levels. However, a substantial proportion, approximately a quarter, perform above the mean for non-Māori students. Similar patterns are seen in mathematical and scientific literacy. (Figure 1)

**Figure 1: Distribution of Literacy among Māori and Non-Māori Students, from the PISA 2000 Study**

Results are scaled in each literacy domain so that the OECD mean equals 500 points, with about two thirds of students across OECD countries scoring between 400 and 600 points. The resulting numerical scale scores cannot be compared directly among the three domains.

A wide range of achievement is found among both Māori and non-Māori students in PISA. The results indicate that the difference in scale scores from the fifth to the ninety-fifth percentile, i.e., across the middle 90 percent of each subpopulation (some 300-350 score points depending on the domain), is several times wider than the differences in average literacy levels between the two groups (approximately 50-60 score points). This suggests that disparities in achievement are greater within than between the Māori and non-Māori subpopulations.

The larger proportion of Māori students at the lower end of the reading literacy scale is potentially a concern. For example, school leavers with lower literacy skills may have poorer prospects of employment. To understand how the distribution of scale scores translates into concrete competencies, the next subsection examines the proportion of Māori students who reach varying levels of proficiency in reading literacy.

### Māori Achievement in Reading Literacy Proficiency Levels

The reading literacy scale in PISA comprises three subscales, each measuring a particular aspect of reading literacy. The subscales report on student abilities in:

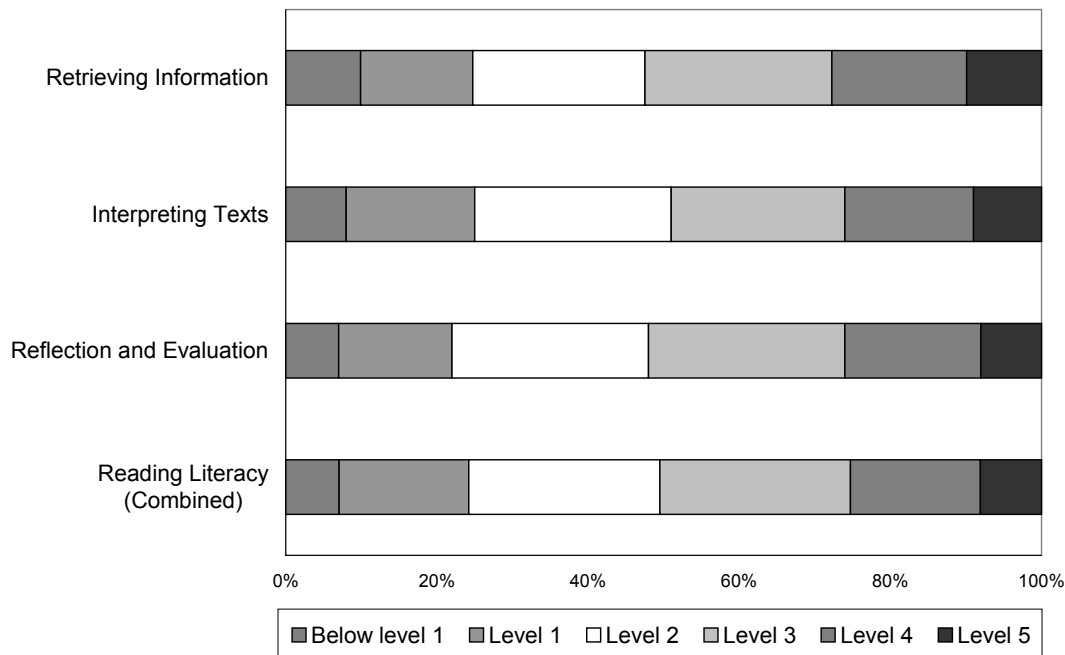
- retrieving information,
- interpreting texts,
- reflection and evaluation.

In each subscale, the assessment tasks are divided into five levels of difficulty. The extent to which students are capable of completing tasks at each level determines which of five proficiency levels they have reached. Level 1 indicates competency in the simplest tasks, and Level 5 competency in the most complex tasks.

Students at each level are able to answer at least half of the items at that level correctly, and have demonstrated proficiency at each of the lower levels. The subscales and the difficulty of tasks at each proficiency level are described in Box 2.

The results suggest that the proportions of Māori students at each proficiency level are quite similar across the three subscales. The overall (combined) reading literacy scale summarises the results from the three subscales. Approximately eight percent of Māori students reach Level 5 on the combined reading scale, and 26 percent are proficient at Level 4 or above. Half are in the mid range of achievement (Levels 2 and 3), while another 24 percent are at or below Level 1. (Figure 2)

**Figure 2: Distribution of Māori Students across Reading Literacy Proficiency Levels, from the PISA 2000 Study**



The 8.3 percent of Māori students at Level 5 are capable of completing sophisticated reading tasks. Tasks at Level 4 are complex and difficult. Approximately 17.4 percent of Māori students are at this level.

At Level 1, students are competent in only the simplest tasks. Many of the 16.6 percent of Māori students at Level 1 may not be acquiring the necessary skills and knowledge to benefit fully from educational opportunities at school and in later life.

The 7.5 percent of Māori students below Level 1 are unable to complete at least half of the easiest questions in the PISA assessment correctly. It must be emphasised that reading literacy is defined at a level well above the most basic reading skills. The focus is on reading to learn. Those students below Level 1 may technically be able to read, but are severely limited in the skills required to fully utilise written texts and documents in the learning process.

These results show a huge gap between the top and bottom eight percent of Māori students. Those students below Level 1 will likely have serious difficulty using their reading literacy skills to gain knowledge and skills in other areas, increasing the risk that as school leavers they will lack qualifications and have difficulty finding work.

**Box 2: What the Proficiency Levels Measure**

	Retrieving information	Interpreting texts	Reflection and evaluation
What is being assessed on each of the reading literacy scales:			
	Retrieving information is defined as locating one or more pieces of information in a text.	Interpreting texts is defined as constructing meaning and drawing inferences from one or more parts of a text.	Reflecting and evaluation is defined as relating a text to one's experience, knowledge and ideas.
Characteristics of the tasks associated with increasing difficulty on each of the reading literacy scales:			
	Task difficulty depends on the number of pieces of information that need to be located. Difficulty also depends on the number of conditions that must be met to locate the requested information, and on whether what is retrieved needs to be sequenced in a particular way. Difficulty also depends on the prominence of information, and the familiarity of the context. Other relevant characteristics are the complexity of the text, and the presence and strength of competing information.	Task difficulty depends on the type of interpretation required, with the easiest tasks requiring identifying the main idea in a text, more difficult tasks requiring understanding relationships that are part of the text, and the most difficult requiring either an understanding of the meaning of language in context, or analogical reasoning. Difficulty also depends on how explicitly the text provides the ideas or information the reader needs in order to complete the task; on how prominent the required information is; and on how much competing information is present. Finally, the length and complexity of the text and the familiarity of its content affect difficulty.	Task difficulty depends on the type of reflection required, with the easiest tasks requiring simple connections or explanations relating the text to external experience, and the more difficult requiring an hypothesis or evaluation. Difficulty also depends on the familiarity of the knowledge that must be drawn on from outside the text; on the complexity of the text; on the level of textual understanding demanded; and on how explicitly the reader is directed to relevant factors in both the task and the text.
<b>Level</b>			
<b>5</b>	Locate and possibly sequence or combine multiple pieces of deeply embedded information, some of which may be outside the main body of the text. Infer which information in the text is relevant to the task. Deal with highly plausible and/or extensive competing information.	Either construe the meaning of nuanced language or demonstrate a full and detailed understanding of a text.	Critically evaluate or hypothesise, drawing on specialised knowledge. Deal with concepts that are contrary to expectations and draw on a deep understanding of long or complex texts.
<b>4</b>	Locate and possibly sequence or combine multiple pieces of embedded information, each of which may need to meet multiple criteria, in a text with unfamiliar context or form. Infer which information in the text is relevant to the task.	Use a high level of text-based inference to understand and apply categories in an unfamiliar context, and to construe the meaning of a section of text by taking into account the text as a whole. Deal with ambiguities, ideas that are contrary to expectation and ideas that are negatively worded.	Use formal or public knowledge to hypothesise about or critically evaluate a text. Show accurate understanding of long or complex texts.
<b>3</b>	Locate, and in some cases recognise, the relationship between pieces of information, each of which may need to meet multiple criteria. Deal with prominent competing information.	Integrate several parts of a text in order to identify a main idea, understand a relationship or construe the meaning of a word or phrase. Compare, contrast or categorise taking many criteria into account. Deal with competing information.	Make connections or comparisons, give explanations, or evaluate a feature of text. Demonstrate a detailed understanding of the text in relation to familiar, everyday knowledge, or draw on less common knowledge.
<b>2</b>	Locate one or more pieces of information, each of which may be required to meet multiple criteria. Deal with competing information.	Identify the main idea in a text, understand relationships, form or apply simple categories, or construe meaning within a limited part of the text when the information is not prominent and low-level inferences are required.	Make a comparison or connections between the text and outside knowledge, or explain a feature of the text by drawing on personal experience and attitudes.
<b>1</b>	Take account of a single criterion to locate one or more independent pieces of explicitly stated information.	Recognise the main theme or author's purpose in a text about a familiar topic, when the required information in the text is prominent.	Make a simple connection between information in the text and common, everyday knowledge.

## General Outcomes of Learning

Once they leave school, people have to manage most of their own learning. The ability to add to the knowledge and skills learned in reading, mathematics, science and other curriculum areas will be enhanced by a positive disposition toward learning and a grasp of the different ways to approach learning itself. An important goal of education is to foster these outcomes that prepare students to continue learning throughout life. In PISA they are referred to as general outcomes of learning, and are measured by constructing indices that summarise student responses to a series of related questions. As these measures rely on self-reporting by students they may be influenced by cross-cultural differences in response behaviour or the social desirability of certain responses.

## Motivation and Engagement

On average, Māori and Pasifika students report greater *engagement with school* than other ethnic groups.

*The PISA index of engagement with school is derived from students' level of agreement or disagreement with the following statements prefaced with 'My school is a place where': I feel like an outsider (or left out of things); I make friends easily; I feel like I belong; I feel awkward and out of place; other students seem to like me; I feel lonely; I do not want to go; I often feel bored.*

Māori students generally express less *interest in reading* than other ethnic groups.

*The index of interest in reading is derived from students' level of agreement or disagreement with the following statements: because reading is fun, I wouldn't want to give it up; I read in my spare time; and, when I read, I sometimes get totally absorbed.*

They also report lower *engagement in reading*...

*The index of engagement in reading is derived from students' level of agreement or disagreement with the following statements: I read only if I have to; reading is one of my favourite hobbies; I like talking about books with other people; I find it hard to finish books; I feel happy if I receive a book as a present; for me reading is a waste of time; I enjoy going to a bookstore or a library; I read only to get information that I need; and, I cannot sit still and read for more than a few minutes.*

...and participation in more limited recreational *reading activities*.

*The index of reading activities is derived from students' indication of whether they 'never or hardly ever', 'a few times a year', 'about once a month', 'several times a month', or 'several times a week' read because they wanted to: magazines, comic books, fiction (novels, narratives, stories), non-fiction books, e-mails and web pages or newspapers.*

Māori and Pakeha students tend to report much lower *interest in mathematics* than other ethnic groups.

*The index of interest in mathematics is derived from students' level of agreement or disagreement with the following statements: when I do mathematics, I sometimes get totally absorbed; mathematics is important to me personally; and because doing mathematics is fun, I wouldn't want to give it up.*

The high average index of engagement with school for Māori students suggests they are more positive about the school social environment than some other ethnic groups and because of this may be more likely to engage in learning activities in later life. On the other hand, low interest and engagement in reading will affect the quality of learning and the ongoing level of engagement in this domain.

## Learning Strategies

On average, Māori students report lower use of *control strategies* than other ethnic groups.

*The PISA index of control strategies is derived from the frequency with which students used the following strategies when studying: I start by figuring out what exactly I need to learn; I force myself to check to see if I remember what I have learned; I try to figure out which concepts I still haven't really understood;*

*I make sure that I remember the most important things; and, when I study and I don't understand something, I look for additional information to clarify this.*

Māori, Pakeha and Pasifika students generally report lower use of *memorisation strategies* than Asian students...

*The index of memorisation strategies is derived from the frequency with which students used the following strategies when studying: I try to memorise everything that might be covered; I memorise as much as possible; I memorise all new material so that I can recite it; and practise by saying the material to myself over and over.*

...and the same is true for *elaboration strategies*.

*The index of elaboration strategies is derived from the frequency with which students used the following strategies when studying: I try to relate new material to things I have learned in other subjects; I figure out how the information might be useful in the real world; I try to understand the material better by relating it to things I already know; and, I figure out how the material fits in with what I have already learned.*

Māori students express greater strength in *co-operative learning* situations than Pakeha students, but less than Pasifika students.

*The index co-operative learning is derived from students' level of agreement or disagreement with the following statements: I like to work with other students; I learn the most when I work with other students; I do my best work when I work with other students; I like to help other people do well in a group; and, it is helpful to put together everyone's ideas when working on a project.*

Māori students are lower on the *competitive learning* index than Pakeha and Asian students...

*This index is derived from the students' level of agreement or disagreement with the following statements: I like to try to be better than other students; trying to be better than others makes me work well; I would like to be the best at something; and, I learn things faster if I'm trying to do better than the others.*

...and report less average *time spent on homework* (but there is no statistical difference between Māori and Pasifika students on these two indices).

*Students' investment in homework is summarised in an index of time spent on homework that combines the weekly time students spent on homework for language (i.e., English for New Zealand), science and mathematics classes.*

Low average index scores for the use of control strategies and time spent on homework may indicate that Māori students are not acquiring sufficient skills to manage their own learning process and workload to the same extent as other ethnic groups. Note that both co-operating with others and competing against others can be appropriate and effective learning styles in different situations.

### Student Self-Concepts

On average, Māori and Pakeha students report a higher *self-concept in reading* than other ethnic groups.

*The PISA index of self-concept in reading is derived from students' level of agreement or disagreement with the following statements: I'm hopeless in English classes; I learn things quickly in English class; and, I get good marks in English.*

Māori, Pakeha and Pasifika students tend to express a much lower *self-concept in mathematics* than Asian students.

*The index of self-concept in mathematics is derived from students' level of agreement or disagreement with the following statements: I get good marks in mathematics; mathematics is one of my best subjects; and, I have always done well in mathematics.*

Māori students' overall *self-concept in academic ability* is generally lower than Pakeha and Asian students, but not statistically different from Pasifika students.

*The index of self-concept in academic ability is derived from students' level of agreement or disagreement with the following statements: I learn things quickly in most school subjects; I'm good at most school subjects; and, I do well in tests in most school subjects.*

On average, Māori students report lower *comfort with and perceived ability to use computers* than Pakeha students, but there is no statistical difference between Māori and Asian or Pasifika students.

*The index of comfort with and perceived ability to use computers is derived from students' responses to the following questions: How comfortable are you with using a computer?; How comfortable are you with using a computer to write a paper?; How comfortable are you with taking a test on a computer?; and, If you compare yourself with other 15-year-olds, how would you rate your ability to use a computer?*

The general outcomes examined here are important in providing students with a foundation for lifelong learning, but are they also linked to success at school? Among Māori students, several of the indices are related to higher attainment in reading literacy, as will be seen in Part 2.

## 2. FACTORS ASSOCIATED WITH MĀORI ACHIEVEMENT IN READING LITERACY

PISA found both high and low achievers in the Māori student population at age 15. This section investigates the relationships between achievement levels in reading literacy and a range of student, family and school-related factors that may be associated with these differences in performance.

The analysis focuses on reading literacy for two main reasons. First, because it was the major domain assessed in PISA 2000, the study provides more information about reading literacy than the other domains. This includes information on students' reading proficiency levels that are used here to define high and low achievers. Second, there are also more student responses to the reading literacy assessment, allowing more detailed analysis to be undertaken.

The reading proficiency levels allow us to define high achievers in absolute terms, based on what they can do. For the purposes of this report, students reaching Level 4 and above are considered high achievers. Tasks at Levels 4 and 5 are complex and difficult, as described in the previous section. (See Box 2 for further details.) Approximately 26 percent of Māori students reach Level 4 or above, and are considered high achievers.

Another consideration in defining high achievers at this level, rather than at Level 5 which includes eight percent of Māori students, is that the larger sample size facilitates more detailed analysis. Where comparisons are made with medium and low achievers, these are defined as students at Levels 2 and 3 (medium achievers) and those at or below Level 1 (low achievers).

Caution is advised in the interpretation of causality in the following results. While the analysis seeks to identify factors associated with high achievement, such statistical relationships do not in themselves establish a causal link. Nor is a particular direction of causation necessarily implied. For instance, interest in reading and performance may be mutually reinforcing.

This section draws on Tables 6-9 in the Appendix. The differences described in the text and shown in the charts between demographic subgroups, and between high and low achievers, should be read as statistically significant unless otherwise indicated. This can be confirmed by referring to the Appendix tables, which include significance tests for these comparisons.

### Demographic Characteristics

Across all of the Māori students in PISA approximately 26 percent are defined as high achievers, 50 percent as medium achievers and 24 percent as low achievers. When the results are examined for specific groups, such as girls and boys, this distribution of students across achievement levels can vary considerably indicating that in some demographic subgroups Māori students are more likely to be high achievers than in others.

#### Gender

Among the Māori students in PISA, girls are more likely to be high achievers than boys. The results show that 32 percent of Māori girls are high achievers, compared to 19 percent of Māori boys. Māori girls are also less likely to be low achievers (17 percent) than their male counterparts (32 percent). This pattern of girls outperforming boys in reading literacy reflects the general trend for all countries in PISA.

#### Ethnic Identification

Of all the Māori students in PISA, 51 percent reported sole-Māori ethnicity while 49 percent also identified with another ethnic group, mainly Pakeha (37 percent). This ratio of sole-Māori to multi-ethnic identification is in line with results from the 2001 Census.

Statistically, Māori students who also identify with another ethnic group are more likely to be high achievers than those who identify solely as Māori. PISA found approximately 37 percent of these multi-ethnic Māori students are high achievers compared to 15 percent of sole-Māori students. Multi-ethnic Māori students are also less likely to be low achievers (16 percent) compared to sole-Māori students (32 percent).

These different outcomes are likely to reflect in part differences in the socio-economic status (SES) of multi-ethnic and sole-Māori students. Multi-ethnic Māori students are more likely to come from medium or high SES backgrounds than sole-Māori students, while sole-Māori students are more likely to come from low SES backgrounds, as measured in PISA (see below).

### Socio-Economic Background

Māori students from high socio-economic backgrounds are more likely to be high achievers than those from low socio-economic backgrounds. PISA found that 36 percent of Māori students from families of high socio-economic status are high achievers compared to 19 percent of those from low SES families.

The socio-economic background of students is measured by the PISA *International Socio-Economic Index of Occupational Status* (ISEI) which is derived from information provided by students about the occupations of parents. The index captures the attributes of occupations that convert parents' education into income. It is based on either the mother's or the father's occupation, whichever is the higher. Students of high, medium and low socio-economic status are defined here (to a close approximation) as those in the top, middle and bottom third of all New Zealand students on the ISEI scale.

### Family Type

PISA did not find evidence of a statistically significant difference in the percentage of Māori students who are high achievers whether, at age 15, they came from single-parent or nuclear families. A broadly similar proportion of students from each family type (24 and 29 percent respectively) are high achievers. However, the results do show that those from nuclear families are less likely to be low achievers (20 percent) than those from single-parent families (30 percent).

In PISA, single-parent families are defined as including only one parent or other guardian (e.g., a step-parent or foster parent). Nuclear families include both of the student's parents. A third category includes "Other" family arrangements such as living with one parent and another guardian (e.g., a step-parent), living with two other guardians (e.g., foster parents) or living with other family members (e.g., grandparents). Due to the constraints of sample size, comparable estimates are not available for the "Other" family type.

### Mother's Education

PISA results suggest that Māori 15-year-olds whose mothers have completed upper secondary education only are just as likely to be high achievers as those whose mothers have completed tertiary education. Thirty-two percent of students in both categories were found to be high achievers. Similarly, no statistical difference was found in the likelihood that Māori students with these levels of maternal education would be low achievers. Comparable estimates for students with lower levels of maternal education are not available due to the constraints of sample size.

### Number of Siblings

Māori students with fewer than three siblings are more likely to be high achievers than those with three or more siblings. PISA found that 32 percent of Māori students with fewer than three brothers and sisters are high achievers, compared to 20 percent of those from larger families. Māori students with fewer than three siblings are also less likely to be low achievers (20 percent) compared to those with three or more siblings (28 percent).

### **School Decile**

Māori students at high decile schools are more likely to be high achievers than those at low decile schools. PISA found that 45 percent of Māori students at decile 8-10 schools are high achievers compared to 18 percent at decile 1-3 schools.

School decile is related to socio-economic status. A school's decile indicates the extent to which the school draws its students from low socio-economic communities. Decile 1 schools are the 10 percent of schools with the highest proportion of students from low socio-economic communities, whereas decile 10 schools are the 10 percent of schools with the lowest proportion of these students.

The measure of socio-economic status used in the decile rating differs from that used in PISA. PISA measures the socio-economic background of students based on the information they provide about the occupational status of parents. By contrast, the decile ranking applies to schools, and takes into account census information on household income, occupation, household crowding, educational qualifications and income support for households with school-aged children in the areas where the school's students live, as well as school ethnicity data.

### **School Gender**

Māori students at single sex schools are more likely to be high achievers than those at co-educational institutions. PISA found that 38 percent of Māori students at single sex schools are high achievers compared to 22 percent of those at co-ed schools. Among Māori students the percentage of high achievers is particularly high at girls' schools (47 percent).

These different outcomes are likely to reflect in part differences in the socio-economic status of Māori students at single sex and co-ed schools. Those at single sex schools are more likely to come from high SES backgrounds than those at co-ed schools (as measured in PISA), and among these institutions the single sex schools are more likely to have a high decile rating (decile 8-10) than the co-ed schools.

### **School Locality**

PISA found no statistical difference in the likelihood that Māori students would be high achievers whether they attend school in main and secondary urban areas or in minor urban and rural areas. The results indicate that 26 percent of Māori students are high achievers at schools in main and secondary urban areas, compared to 25 percent of those enrolled in minor urban and rural areas. Similarly, no statistical difference was found in the likelihood that Māori students enrolled in these area types would be low achievers.

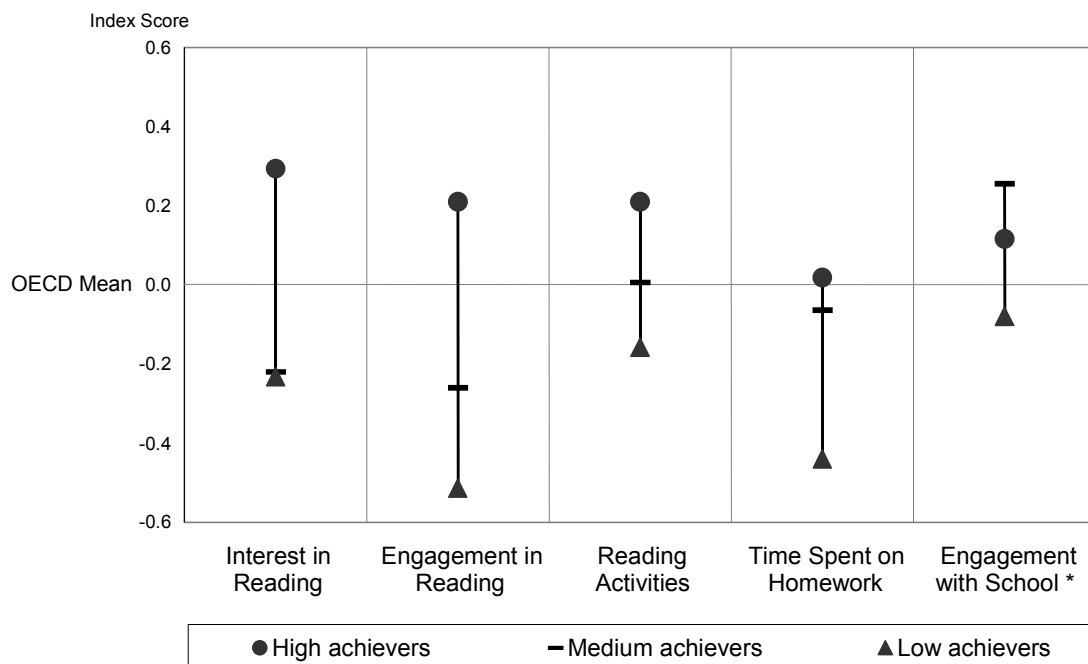
Area types are defined according to Statistics New Zealand's classification of urban and rural areas. Main urban areas are the largest centres with a population of 30,000 or more. Secondary urban areas have a population between 10,000 and 29,999 and are centred on the largest regional centres. Minor urban areas are settlements with a population between 1,000 and 9,999 centred on smaller towns. Rural areas comprise the remaining areas including townships with a population of less than 1,000.

## Student Motivation and Engagement

Figure 3 presents the mean index scores for Māori high, medium and low achievers in PISA on indices relating to motivation and engagement in learning. These indices (and those presented in Figures 4 and 5) are described above under General Outcomes of Learning.

The indices presented in this and subsequent charts are constructed so that the mean for OECD countries equals zero, and the scores for two thirds of students across the OECD fall between the values of 1 and –1. A negative value on an index does not necessarily mean that students responded negatively to the underlying questions; it simply indicates that they are less positive than all students on average across the OECD. Numerical index scores cannot be compared directly among indices.

**Figure 3: Māori Students' Average Index Scores for Motivation and Engagement in Learning, from the PISA 2000 Study**



\* The difference between high and low achievers is not statistically significant.

On the three reading-related measures, the mean index scores for high achievers are generally high relative to the OECD mean. The difference between high and low achievers is particularly large in respect to both interest and engagement in reading (more than half a standard deviation) and also statistically significant for reading activities. The results for engagement in reading and reading activities suggest a linear relationship, i.e., as engagement increases so too does performance, whereas for interest in reading high achievers tend to report greater interest than medium and low achievers, who both tend to express a relative lack of interest in reading.

The difference between high and low achievers in time spent on homework is also sizeable. High and medium achievers report spending on average a similar amount of time on homework to the OECD mean. By contrast, low achievers report spending significantly less time on homework than high achievers.

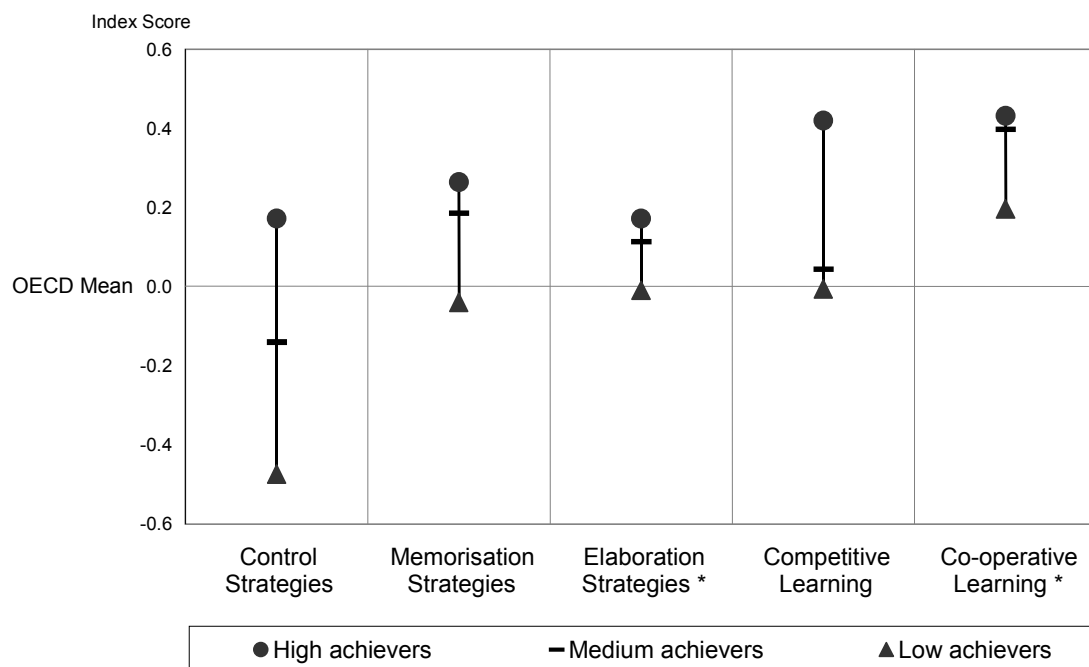
The difference between high and low achievers in average levels of engagement with school is not statistically significant, suggesting that this is not a key factor in promoting academic success.

## Use of Learning Strategies

In PISA, the difference between Māori high and low achievers in the reported use of control strategies is large (more than half a standard deviation) suggesting a strong link between students' ability to manage the learning process and achievement in reading literacy. This is not so much because high achievers score highly on this index (their mean score is not significantly higher than the OECD mean) but rather because low achievers score on average well below the OECD mean.

By contrast, the difference between high and low achievers in the use of memorisation strategies is smaller, and for elaboration strategies the difference is not statistically significant. Nevertheless, high achievers do report on average significantly greater use of both these types of strategy than the OECD mean. (Figure 4)

**Figure 4: Māori Students' Average Index Scores for Use of Learning Strategies, from the PISA 2000 Study**

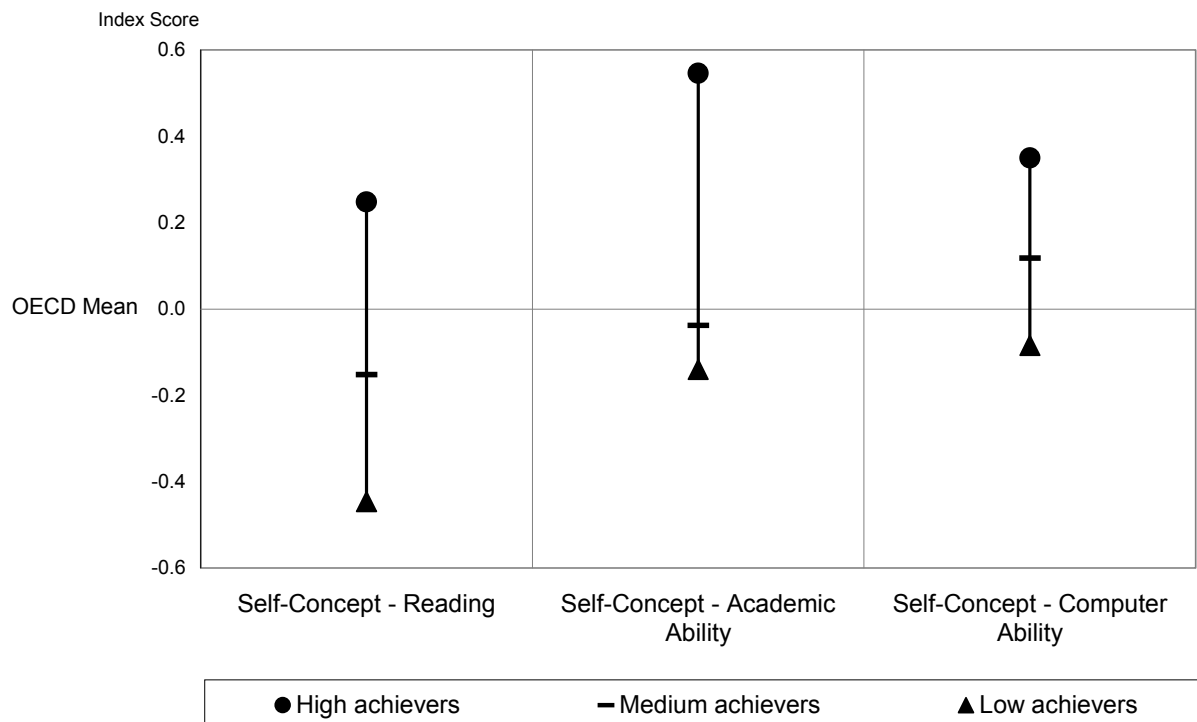


\* The difference between high and low achievers is not statistically significant.

Relative to the OECD mean, high achievers tend to report strength in both competitive and co-operative learning styles. In relation to competitive learning, the difference between high and low achievers is substantial and high achievers tend to report greater strength than both medium and low achievers. In relation to co-operative learning, this difference is not statistically significant.

## Student Self-Concepts

Figure 5 shows mean index scores from PISA on indices of student self-concept in reading, general academic ability, and comfort with and perceived ability to use computers. On all of these measures the reported self-concepts of Māori high achievers are high compared to the OECD mean, and high achievers tend to be generally much more confident in their own abilities than low achievers. This is perhaps least surprising in relation to reading, as high achievers have been defined in terms of their reading proficiency. However, the results show that such students are also on average more confident in their general academic ability, and in their ability to use computers.

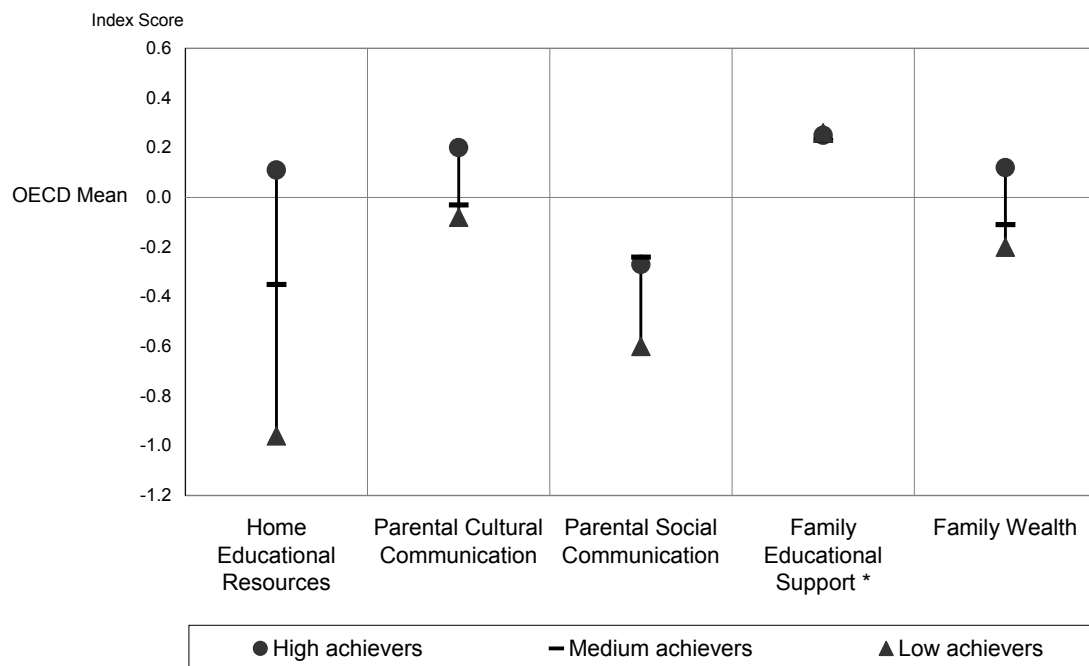
**Figure 5: Māori Students' Average Index Scores for Student Self-Concepts, from the PISA 2000 Study**

### Family Background

The largest difference between Māori high and low achievers in PISA on the family background factors examined is in the availability of educational resources in the home. The index of *home educational resources* is derived from students' reports on the availability in their home of a dictionary, a quiet place to study, a desk for study, textbooks and the number calculators.

Among high achievers, 99 percent report having a dictionary in the home compared to 89 percent of low achievers, 94 percent have a quiet place to study compared to 75 percent of low achievers, 94 percent have text books compared to 69 percent of low achievers, 83 percent have a desk for study compared to 69 percent of low achievers, and 76 percent have more than 3 calculators compared to 41 percent of low achievers.

The mean score for high achievers is close to the OECD mean on the index of home educational resources, and approximately one standard deviation higher than the average for low achievers. The mean for medium achievers is in an intermediate position suggesting a strong linear relationship between achievement in reading literacy and home educational resources. (Figure 6)

**Figure 6: Māori Students' Average Index Scores for Family Background Factors, from the PISA 2000 Study**

\* The difference between high and low achievers is not statistically significant.

High achievers tend to report more frequent communication with parents on social and cultural topics than low achievers. To assess parental interaction, students were asked about the frequency of communication and interaction with their parent(s) or guardian(s). From their responses two indices were derived. The first is an index of *cultural communication* based on responses to questions about: discussing social and political issues; discussing books, films or television programs; and listening to music together. The second is an index of *social communication* based on responses to questions about: discussing how well the student was doing at school; eating the main meal together and spending time just talking.

On both measures the mean for high achievers is significantly higher than the average for low achievers. On the index of cultural communication, the mean score for Māori high achievers is above the OECD mean, while on the index of social communication it is below the OECD mean which reflects the general trend for New Zealand students in PISA.

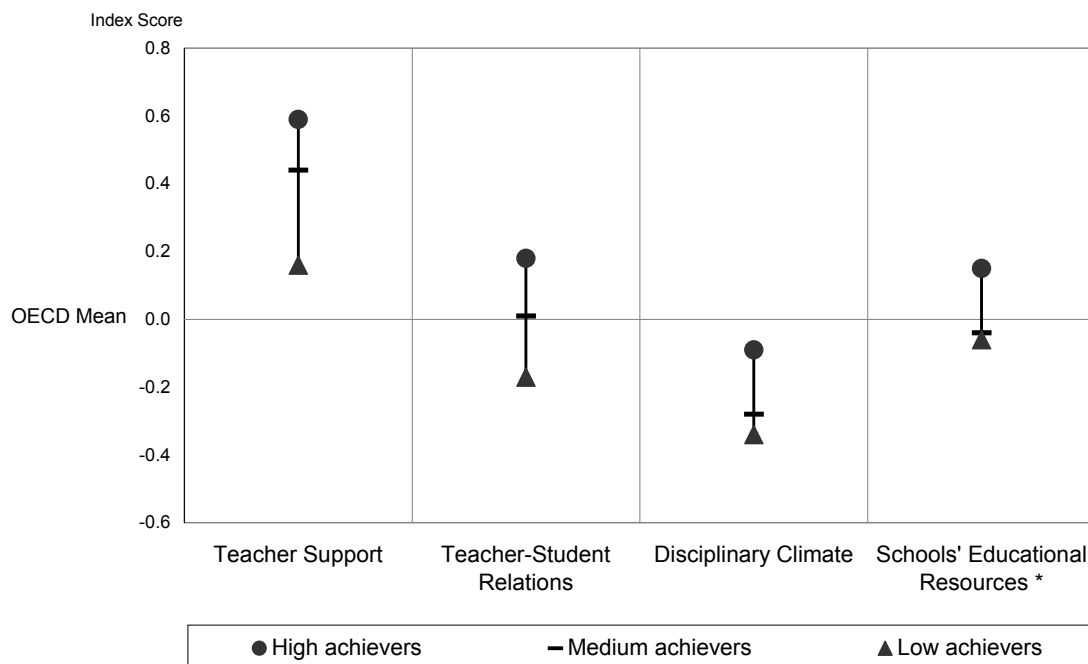
Mean scores for high and low achievers are not statistically different on the index of *family educational support*. This measures the extent to which immediate family members (mothers, fathers and siblings) help students with their schoolwork. Both groups tend to receive a high level of support compared to the OECD mean. Internationally, family educational support is negatively associated with achievement in nearly all countries in PISA, indicating that students with lower academic achievement, and therefore perhaps a greater need of assistance, tend to receive more help from family members than students with higher achievement.

High achievers tend to come from more affluent families than low achievers. Family wealth is related to socio-economic status. The index of *family wealth* is derived from students' reports on: i) the availability, in their home, of a dishwasher, a room of their own, educational software, and a link to the Internet; and ii) the number of cellular phones, television sets, computers, motor cars and bathrooms at home. The mean score for high achievers is close to the OECD mean, and significantly higher than both medium and low achievers.

## In the Classroom

In PISA, Māori high achievers tend to report greater *teacher support* in the classroom than Māori low achievers. To provide an indicator of this aspect of the classroom practice, PISA derived an index from students' reports on the frequency with which, in English lessons: the teacher shows an interest in every student's learning; the teacher gives students an opportunity to express opinions; the teacher helps students with their work; the teacher continues teaching until the students understand; the teacher does a lot to help students; and, the teacher helps students with their learning. (In non-English speaking countries students are asked about classes in their own language of assessment.) The mean score for high achievers is high compared to the OECD mean. (Figure 7)

**Figure 7: Māori Students' Average Index Scores for Classroom Factors, from the PISA 2000 Study**



\* The difference between high and low achievers is not statistically significant.

High achievers tend to report better *teacher-student relations* than low achievers. This index is derived from students' reports on their level of agreement or disagreement with the following statements: students get along well with most teachers; most teachers are interested in students' well-being; most of my teachers really listen to what I have to say; if I need extra help, I will receive it from my teachers; and most of my teachers treat me fairly. The mean score for high achievers is above the OECD mean.

On average, high achievers report a better *disciplinary climate* in their English classes than low achievers. This index summarises students' reports on the frequency with which, in their English class: the teacher has to wait a long time for students to quiet down; students cannot not work well; students don't listen to what the teacher says; students don't start working for a long time after the lesson begins; there is noise and disorder; and, at the start of class, more than five minutes are spent doing nothing. (The index is inverted so that lower values tend to indicate a poorer disciplinary climate. In non-English speaking countries students are asked about classes in their own language of assessment.) The mean score for high achievers is close to the OECD mean.

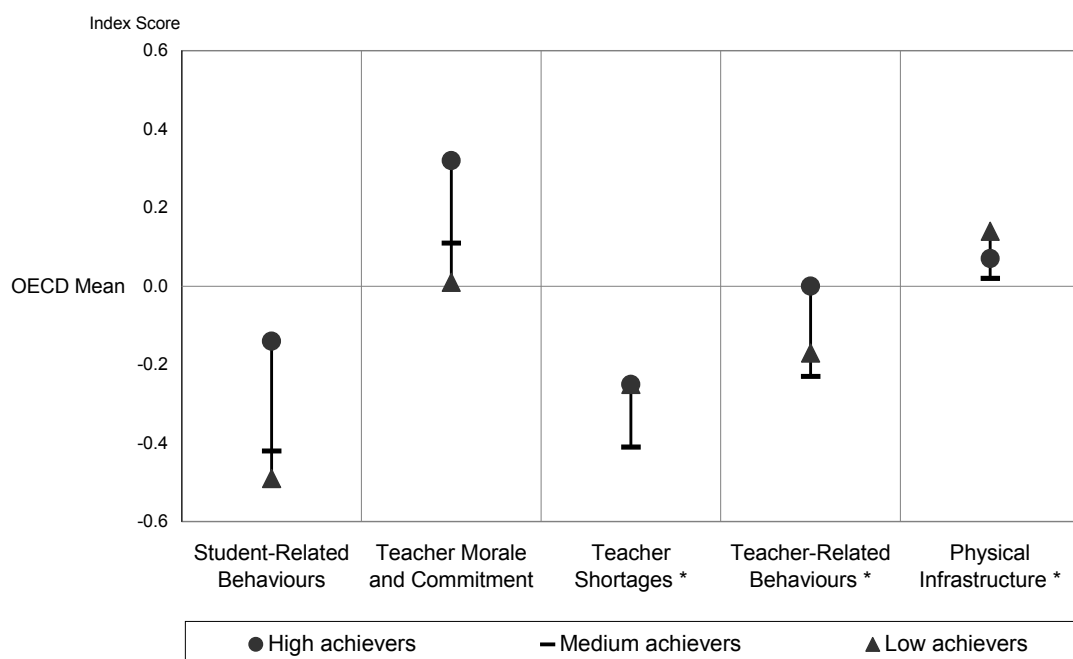
On average, high and low achievers differ little in the *quality of schools' educational resources* reported by principals at their schools. This index is an indicator of the quality of educational resources at each student's school, derived from principals' reports of the extent to which learning by 15-year-olds is hindered by: not enough computers for instruction; lack of instructional materials in the library; lack of multi-media resources for instruction; inadequate science laboratory equipment; and inadequate facilities for the fine arts. (The index is

inverted so that lower values tend to indicate greater hindrance.) The mean index score for high achievers is close to the OECD mean and not significantly different to the average for low achievers.

## Wider School Issues

Compared to Māori low achievers, the Māori high achievers in PISA tend to come from schools where principals report problematic *student-related behaviours* as being less of an issue. The index of student-related factors affecting school climate summarises principals' reports of the extent to which learning by 15-year-olds at each student's school is hindered by: student absenteeism; disruption of classes by students; students skipping classes; students lacking respect for teachers; the use of alcohol or illegal drugs; and students intimidating or bullying other students. (The index is inverted so that lower values tend to indicate greater hindrance.) The mean score for high achievers is close to the OECD mean. (Figure 8)

**Figure 8: Māori Students' Average Index Scores for Wider School Factors, from the PISA 2000 Study**



\* The difference between high and low achievers is not statistically significant.

Compared to low achievers, high achievers tend to come from schools where principals report higher *teacher morale and commitment*. This index is derived from the extent to which principals at each student's school agree or disagree with the following statements: the morale of the teachers in this school is high; teachers work with enthusiasm; teachers take pride in this school; and teachers value academic achievement. The mean score for high achievers is significantly higher than the OECD mean.

On average, high and low achievers do not differ in the impact, as gauged by school principals, that *teacher shortages* have on learning at their schools. Nor on average are there significant differences between high and low achievers in the degree to which principals see problematic *teacher-related behaviours* or the poor quality of *schools' physical infrastructure* as a hindrance to learning at their schools. On all three measures, the mean score for high achievers is close to the OECD mean and not statistically different from the average for low achievers. These factors are measured as follows:

- The index of teacher shortage is derived from the principals' view on how much learning by 15-year-old students is hindered by the shortage or inadequacy of teachers in English, mathematics or science. (The index is inverted so that lower values tend to indicate greater hindrance. In non-English speaking countries principals are asked about teachers in their own language of assessment.)

- The index of the principals' perceptions of teacher-related factors affecting school climate was derived from principals' reports on the extent to which learning by 15-year-olds was hindered by: the low expectations of teachers; poor student-teacher relations; teachers not meeting individual students' needs; teacher absenteeism; staff resisting change; teachers being too strict with students; and students not being encouraged to achieve their full potential. (The index is inverted so that lower values tend to indicate greater hindrance.)
- The index of the quality of a school's physical infrastructure was derived from principals' reports on the extent to which learning by 15-year-olds in their school was hindered by: poor condition of buildings; poor heating and cooling and/or lighting systems; and lack of instructional space (e.g., classrooms). (The index is inverted so that lower values tend to indicate greater hindrance.)

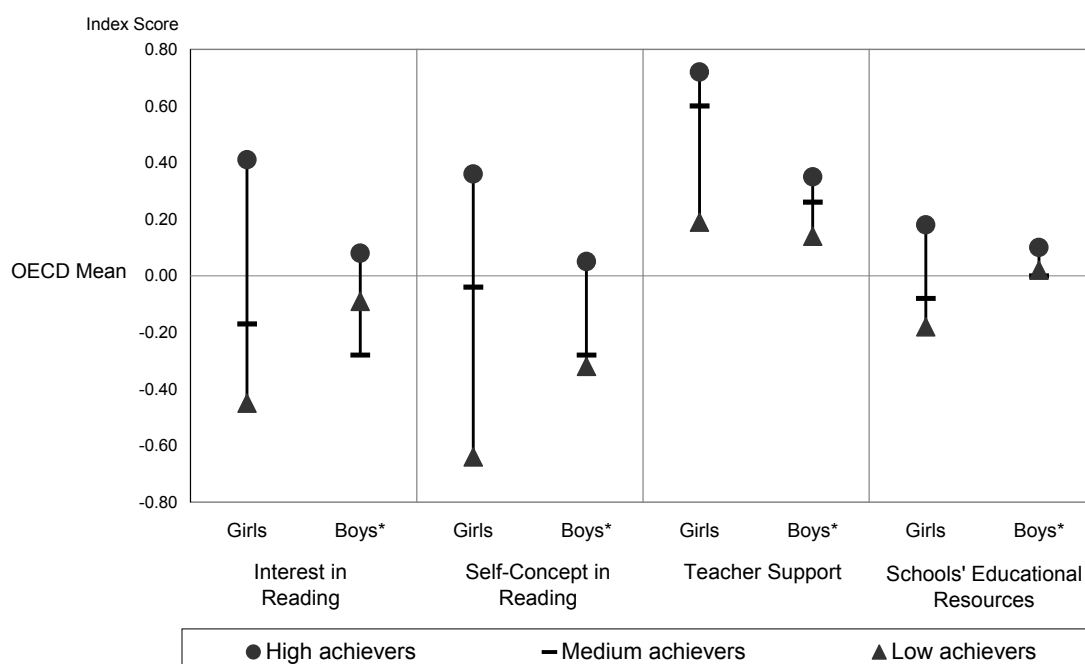
### Mean Index Scores for High and Low Achievers Disaggregated by Gender

For most of the PISA 2000 indices examined above, the difference in the overall mean scores of high and low achieving Māori students is broadly reflective of the trend for both girls and boys. In some cases, however, when the overall score is disaggregated by gender the difference between high and low achievers does not follow the same pattern for girls that it does for boys.

Figure 9 highlights the most disparate of these gender comparisons. On the indices of *interest in reading* and *self-concept in reading* the difference between high and low achievers is very large for girls, yet relatively small and not statistically significant for boys. This suggests a strong association between these factors and achievement for girls in contrast to no apparent relationship for boys. On the index of *teacher support* the contrast between girls and boys, though not as great, is also substantial.

No statistical difference was observed between high and low achieving Māori students overall on the index of *schools' educational resources*, but when disaggregated by gender the results suggest an association between this factor and achievement for girls. (This index has been inverted so that lower values correspond to less positive reports from principals on this factor.)

**Figure 9: Māori Students' Average Index Scores for Selected Indices by Gender, from the PISA 2000 Study**



\* The difference between high and low achievers is not statistically significant.

## **CONCLUSION**

The findings presented in this report indicate that while Māori achievement in reading, mathematical and scientific literacy as assessed by PISA is on average poorer than for Pakeha or Asian students, achievement levels vary widely within the Māori student population. In reading literacy, the major domain in PISA 2000, a substantial proportion of Māori students (26 percent) achieve a high level of proficiency.

The proportion of Māori students who are high achievers varies across demographic subgroups: girls, multi-ethnic Māori students, those with fewer than 3 siblings, those from high SES families, high decile schools or single sex schools are more likely to be high achievers than their counterparts. PISA did not find any significant difference in the likelihood that Māori students would be high achievers whether at age 15 they come from single-parent or nuclear families, whether their mothers have completed upper secondary or tertiary education, or whether they attend school in a larger urban area or a minor urban/rural area.

High achievement among Māori students was found to be associated with 19 of the 27 PISA indices investigated. In particular, large differences are observed between high and low achievers in a number of student-related factors including both interest and engagement in reading, the use of control strategies, and student self-concepts in both reading and academic ability. However, the largest difference relates to the availability of educational resources in the home. Significant differences were also found in a number of school-related factors.

The associations found in PISA do not prove that these factors are responsible for high achievement. Such statistical relationships, while often very clear in this study, cannot in themselves establish a causal link. Furthermore, while the study examines a range of key factors relating to students, their families and the learning environment, it provides only a partial picture of the possible determinants of educational achievement. However, when seen in conjunction with existing research, knowledge and experience the findings should assist educators, policy-makers, parents and students to recognise the role these factors may take in promoting success for Māori students, not only at secondary level but also in the earlier years.

In making such judgements, due consideration should be given to the subjective element in these indices, which are based on self-reports by students or principals. The index scores must be read in conjunction with the definitions provided in the report. In some cases the PISA definition of a factor may differ from the meaning generally understood in this country. The way in which PISA assesses achievement may also differ to a degree from that used in the school system.

In August 2000, the Government set a number of challenging targets to raise participation and achievement for Māori across all educational sectors. This report provides a baseline for tracking trends in Māori achievement at age 15 through the successive cycles of the PISA study. While mathematical literacy was the major domain in 2003, and scientific literacy will be the major domain in 2006, in each cycle the study will enable progress to be measured in all of the three PISA literacy domains.

## APPENDIX : PISA 2000 DATA TABLES

The tables presented in this appendix use bold face type to indicate statistically significant differences, as noted under the relevant tables. The significance tests used here and throughout the report meet  $\alpha=0.05$  (i.e., the 5% level). The symbol S.E. stands for standard error, which is included in the tables as an indicator of the uncertainty associated with each estimate. Numerical scale and index scores cannot be directly compared among the different domains or indices. Table 1 also appears in the main body of the report.

**Table 1: Average Scale Scores for Reading, Mathematical and Scientific Literacy, from the PISA 2000 Study**

Domain	Pakeha		Asian		Māori		Pasifika		OECD Countries	
	Mean Scale Score	S.E.	Mean Scale Score	S.E.	Mean Scale Score	S.E.	Mean Scale Score	S.E.	Mean Scale Score	S.E.
Reading Literacy	<b>554</b>	(3.0)	<b>513</b>	(7.9)	482	(4.3)	<b>462</b>	(9.4)	<b>500</b>	(0.6)
Mathematical Literacy	<b>557</b>	(3.3)	<b>547</b>	(7.5)	498	(5.4)	<b>471</b>	(10.7)	500	(0.7)
Scientific Literacy	<b>553</b>	(2.6)	<b>517</b>	(9.7)	483	(5.2)	463	(9.5)	<b>500</b>	(0.7)

**Bold type indicates that the mean scale score is statistically significantly different to the score for Māori in this domain ( $\alpha=0.05$ ).**

**Table 2: Average Scale Scores by Ethnic Group and Gender, from the PISA 2000 Study**

Domain/Gender	Pakeha		Asian		Māori		Pasifika		New Zealand*	
	Mean Scale Score	S.E.	Mean Scale Score	S.E.	Mean Scale Score	S.E.	Mean Scale Score	S.E.	Mean Scale Score	S.E.
READING LITERACY										
Girls	<b>577</b>	(3.8)	<b>541</b>	(8.4)	<b>505</b>	(5.4)	<b>479</b>	(9.1)	<b>553</b>	(3.8)
Boys	<b>532</b>	(3.9)	<b>485</b>	(11.7)	<b>459</b>	(6.7)	<b>445</b>	(14.7)	<b>507</b>	(4.2)
MATHEMATICAL LITERACY										
Girls	556	(4.1)	556	(9.5)	502	(7.7)	467	(13.0)	539	(4.1)
Boys	558	(5.1)	537	(13.8)	495	(8.2)	475	(14.5)	536	(5.0)
SCIENTIFIC LITERACY										
Girls	560	(3.9)	525	(12.2)	487	(6.5)	468	(9.7)	535	(3.8)
Boys	546	(5.0)	509	(13.6)	479	(8.3)	457	(14.7)	523	(4.6)

**Bold type indicates a statistically significant difference between girls and boys in this domain and ethnic group ( $\alpha=0.05$ ).**

\* New Zealand figures include students from the "Other" ethnic group.

**Table 3: Māori and Non-Māori Scale Scores at Selected Percentiles, from the PISA 2000 Study**

Domain/Ethnicity	5 <sup>th</sup> Percentile		25 <sup>th</sup> Percentile		Mean		75 <sup>th</sup> Percentile		95 <sup>th</sup> Percentile	
	Scale Score	S.E.	Scale Score	S.E.	Mean Scale Score	S.E.	Scale Score	S.E.	Scale Score	S.E.
<b>READING LITERACY</b>										
Māori	313	(9.2)	409	(6.5)	482	(4.3)	554	(6.9)	649	(9.6)
Non-Māori	350	(7.2)	475	(4.3)	<b>540</b>	(3.0)	614	(3.1)	699	(6.8)
New Zealand	337	(7.2)	459	(3.9)	<b>529</b>	(2.8)	606	(3.0)	692	(5.7)
<b>MATHEMATICAL LITERACY</b>										
Māori	347	(13.4)	433	(9.2)	498	(5.4)	561	(9.9)	654	(10.2)
Non-Māori	376	(7.4)	485	(5.0)	<b>547</b>	(3.5)	614	(4.1)	694	(5.9)
New Zealand	364	(6.7)	472	(4.0)	<b>537</b>	(3.1)	607	(4.2)	689	(5.1)
<b>SCIENTIFIC LITERACY</b>										
Māori	335	(15.6)	411	(7.2)	483	(5.2)	551	(10.4)	645	(11.7)
Non-Māori	368	(7.0)	475	(4.0)	<b>539</b>	(2.6)	609	(3.2)	688	(5.7)
New Zealand	357	(5.4)	459	(3.8)	<b>528</b>	(2.4)	600	(3.3)	683	(4.3)

**Bold** type indicates that the mean scale score is statistically significantly different to the score for Māori in this domain ( $\alpha=0.05$ ). Significance tests have not been applied to the percentile scale scores.

**Table 4: Percentage of Māori Students at Each Reading Proficiency Level, from the PISA 2000 Study**

Proficiency Level	Retrieving Information		Interpreting Texts		Reflection and Evaluation		Reading Literacy (Combined)	
	%	S.E.	%	S.E.	%	S.E.	%	S.E.
Below Level 1	9.6	(1.3)	8.4	(1.3)	7.4	(1.1)	7.5	(1.4)
Level 1	14.8	(1.9)	16.9	(1.7)	15.0	(1.4)	16.6	(1.9)
Level 2	22.9	(2.5)	25.8	(2.0)	25.5	(2.0)	24.8	(2.7)
Level 3	24.7	(2.2)	23.3	(2.0)	26.1	(1.8)	25.4	(2.7)
Level 4	17.5	(2.1)	16.8	(2.0)	17.6	(1.7)	17.4	(2.2)
Level 5	10.4	(1.4)	8.9	(1.2)	8.4	(1.2)	8.3	(1.4)
Total	100.0	-	100.0	-	100.0	-	100.0	-

Due to rounding figures may not sum exactly to 100 percent.

**Table 5: Mean Index Scores for General Outcomes of Learning, from the PISA 2000 Study**  
(Results based on students' self-reports)

Index	Pakeha		Asian		Māori		Pasifika		OECD Countries	
	Mean Index Score	S.E.	Mean Index Score	S.E.	Mean Index Score	S.E.	Mean Index Score	S.E.	Mean Index Score	S.E.
<b>MOTIVATION &amp; ENGAGEMENT</b>										
Interest in Reading	<b>0.08</b>	(0.02)	<b>0.23</b>	(0.06)	-0.08	(0.04)	<b>0.10</b>	(0.05)	<b>0.00</b>	(0.00)
Engagement in Reading	<b>0.02</b>	(0.03)	<b>0.18</b>	(0.06)	-0.19	(0.04)	<b>0.10</b>	(0.04)	<b>0.00</b>	(0.00)
Reading Activities	<b>0.12</b>	(0.02)	<b>0.45</b>	(0.08)	0.02	(0.04)	<b>0.22</b>	(0.06)	0.00	(0.0) i
Interest in Mathematics	0.00	(0.03)	<b>0.69</b>	(0.05)	0.07	(0.04)	<b>0.36</b>	(0.05)	0.00	(0.00)
Time Spent on Homework	<b>0.07</b>	(0.03)	<b>0.42</b>	(0.06)	-0.13	(0.04)	-0.01	(0.07)	<b>0.00</b>	(0.00)
Engagement with School	<b>-0.04</b>	(0.02)	<b>-0.25</b>	(0.05)	0.14	(0.05)	0.12	(0.06)	<b>0.00</b>	(0.0) i
<b>LEARNING STRATEGIES</b>										
Control Strategies	<b>0.07</b>	(0.03)	<b>0.41</b>	(0.06)	-0.13	(0.05)	<b>0.10</b>	(0.06)	<b>0.00</b>	(0.01)
Memorisation Strategies	0.22	(0.02)	<b>0.48</b>	(0.05)	0.16	(0.04)	0.29	(0.06)	<b>0.00</b>	(0.00)
Elaboration Strategies	0.06	(0.02)	<b>0.38</b>	(0.06)	0.10	(0.04)	0.16	(0.07)	<b>0.00</b>	(0.00)
Competitive Learning	<b>0.27</b>	(0.02)	<b>0.78</b>	(0.05)	0.13	(0.04)	0.23	(0.08)	<b>0.00</b>	(0.00)
Co-operative Learning	<b>0.24</b>	(0.02)	0.27	(0.06)	0.37	(0.04)	<b>0.56</b>	(0.07)	<b>0.00</b>	(0.00)
<b>STUDENT SELF-CONCEPTS</b>										
Reading	-0.06	(0.02)	<b>-0.40</b>	(0.07)	-0.10	(0.05)	<b>-0.27</b>	(0.06)	<b>0.00</b>	(0.0) i
Mathematics	0.16	(0.03)	<b>0.64</b>	(0.07)	0.08	(0.05)	0.15	(0.05)	0.00	(0.0) i
Academic Ability	<b>0.22</b>	(0.03)	<b>0.29</b>	(0.07)	0.10	(0.05)	0.18	(0.06)	<b>0.00</b>	(0.0) i
Computer Ability	<b>0.28</b>	(0.02)	0.27	(0.06)	0.14	(0.04)	0.10	(0.07)	<b>0.00</b>	(0.00)

**Bold** type indicates that the mean index score is statistically significantly different to the score for Māori on this index ( $\alpha=0.05$ ).

*i* indicates that the standard error has been imputed.

**Table 6: Percentage Breakdown of Māori High and Low Achievers by Selected Demographic Characteristics, and Percentage Distribution of Subgroups across Achievement Levels, from the PISA 2000 Study**

Characteristic/Subgroup	BREAKDOWN								DISTRIBUTION							
	Composition of Māori students who are high achievers		Composition of Māori students who are medium achievers		Composition of Māori students who are low achievers		Composition of all Māori students		Percentage of subgroup who are high achievers		Percentage of subgroup who are medium achievers		Percentage of subgroup who are low achievers			
	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.		
ALL MĀORI STUDENTS									25.7	(2.0)	50.2	(2.2)	24.1	(1.8)		
GENDER																
Girls	64.8	(4.9)	52.4	(4.2)	<b>35.7</b>	(4.1)	<b>51.5</b>	(2.6)	<b>32.3</b>	(2.9)	51.1	(3.3)	<b>16.7</b>	(2.2)		
Boys	35.2	(4.9)	47.6	(4.2)	<b>63.7</b>	(4.2)	<b>48.3</b>	(2.6)	<b>18.8</b>	(3.0)	49.5	(3.9)	<b>31.8</b>	(3.1)		
Not Known	0.0	-	0.0	-	c	c	c	c								
Total	100.0	-	100.0	-	100.0	-	100.0	-								
ETHNIC IDENTIFICATION																
Sole Māori	30.1	(4.4)	<b>53.8</b>	(2.9)	<b>68.5</b>	(5.2)	<b>51.3</b>	(2.0)	<b>15.1</b>	(2.7)	52.7	(3.3)	<b>32.2</b>	(3.0)		
Māori Plus Another Ethnic Group	69.9	(4.4)	<b>46.2</b>	(2.9)	<b>31.5</b>	(5.2)	<b>48.7</b>	(2.0)	<b>36.8</b>	(2.6)	47.6	(3.2)	<b>15.6</b>	(2.8)		
Not Known	0.0	-	0.0	-	0.0	-	0.0	-								
Total	100.0	-	100.0	-	100.0	-	100.0	-								
SOCIO-ECONOMIC STATUS (ISEI)																
High	26.2	(3.5)	18.5	(2.0)	c	c	18.5	(1.3)	<b>36.4</b>	(4.8)	50.3	(4.6)	c	c		
Middle	36.6	(4.1)	27.7	(3.0)	<b>23.2</b>	(3.9)	<b>28.9</b>	(2.0)	<b>32.6</b>	(3.9)	<b>48.1</b>	(4.6)	<b>19.3</b>	(3.4)		
Low	35.8	(4.2)	<b>49.5</b>	(3.6)	<b>58.2</b>	(4.9)	<b>48.0</b>	(2.1)	<b>19.1</b>	(2.4)	51.7	(3.7)	29.2	(2.8)		
Not Known	c	c	c	c	c	c	c	c								
Total	100.0	-	100.0	-	100.0	-	100.0	-								
FAMILY TYPE																
Single-Parent	23.9	(3.5)	23.4	(2.3)	31.3	(3.7)	25.4	(1.5)	24.1	(3.6)	46.2	(4.5)	<b>29.7</b>	(4.1)		
Nuclear Family	58.6	(3.9)	51.9	(2.8)	<b>41.7</b>	(4.4)	<b>51.2</b>	(1.8)	29.4	(2.7)	50.9	(2.8)	<b>19.7</b>	(2.6)		
Other	c	c	22.2	(2.5)	23.6	(3.8)	20.7	(1.4)	c	c	<b>53.9</b>	(5.2)	<b>27.4</b>	(4.4)		
Not Known	c	c	c	c	c	c	c	c								
Total	100.0	-	100.0	-	100.0	-	100.0	-								
MOTHER'S EDUCATION																
Completed Tertiary	37.9	(4.0)	<b>26.5</b>	(2.8)	29.4	(4.1)	<b>30.2</b>	(1.7)	32.3	(3.9)	44.2	(4.4)	23.5	(3.7)		
Completed Upper Secondary	37.9	(3.9)	30.1	(3.3)	<b>23.8</b>	(4.6)	<b>30.6</b>	(2.1)	31.8	(3.5)	49.3	(4.2)	18.8	(4.0)		
Not Completed Upper Secondary	c	c	25.7	(2.5)	20.1	(3.2)	21.7	(1.6)	c	c	<b>59.3</b>	(4.8)	<b>22.3</b>	(3.6)		
Not Known	c	c	17.8	(2.5)	26.7	(4.7)	17.5	(1.5)								
Total	100.0	-	100.0	-	100.0	-	100.0	-								
NUMBER OF SIBLINGS																
Fewer Than Three	59.5	(4.1)	<b>45.3</b>	(2.7)	<b>38.4</b>	(4.4)	<b>47.3</b>	(2.0)	<b>32.3</b>	(2.6)	48.1	(3.4)	<b>19.6</b>	(2.5)		
Three or More	40.5	(4.1)	<b>53.5</b>	(2.8)	<b>59.8</b>	(4.5)	<b>51.6</b>	(2.0)	<b>20.1</b>	(2.6)	52.0	(3.1)	<b>27.9</b>	(2.6)		
Not Known	0.0	-	c	c	c	c	c	c								
Total	100.0	-	100.0	-	100.0	-	100.0	-								
SCHOOL DECILE																
High (8-10)	31.1	(4.1)	<b>14.9</b>	(2.6)	c	c	<b>17.6</b>	(1.9)	<b>45.4</b>	(5.6)	42.6	(5.7)	c	c		
Medium (4-7)	45.5	(5.0)	50.8	(4.0)	49.7	(5.0)	49.2	(3.1)	<b>23.8</b>	(2.4)	<b>51.9</b>	(3.0)	<b>24.4</b>	(2.7)		
Low (1-3)	23.3	(5.5)	34.2	(4.3)	<b>39.6</b>	(4.8)	<b>32.7</b>	(3.5)	<b>18.3</b>	(4.0)	52.5	(4.8)	29.2	(3.4)		
Not Known	c	c	c	c	c	c	c	c								
Total	100.0	-	100.0	-	100.0	-	100.0	-								
SCHOOL GENDER																
Single Sex Schools	32.9	(5.1)	<b>20.5</b>	(3.6)	c	c	<b>22.2</b>	(3.2)	<b>38.1</b>	(4.5)	46.4	(4.1)	c	c		
Co-educational Schools	67.1	(5.1)	<b>79.4</b>	(3.7)	<b>83.9</b>	(4.0)	<b>77.3</b>	(3.3)	<b>22.3</b>	(2.2)	51.6	(2.6)	26.1	(2.1)		
Not Known	c	c	c	c	c	c	c	c								
Total	100.0	-	100.0	-	100.0	-	100.0	-								
SCHOOL LOCALITY																
Main & Secondary Urban Areas	70.5	(5.7)	67.9	(3.9)	72.3	(4.2)	69.6	(3.3)	26.0	(2.3)	49.0	(2.5)	25.0	(2.2)		
Minor Urban & Rural Areas	29.5	(5.7)	32.1	(3.9)	27.7	(4.2)	30.4	(3.3)	24.9	(3.9)	53.1	(5.0)	22.0	(3.3)		
Not Known	0.0	-	0.0	-	0.0	-	0.0	-								
TOTAL	100.0	-	100.0	-	100.0	-	100.0	-								

In the *breakdowns*, **bold** type indicates that the percentage is statistically significantly different to the percentage for Māori high achievers in this subgroup ( $\alpha=0.05$ ). In the *distributions*, **bold** type indicates a statistically significant difference between the subgroups shown for a given characteristic, e.g., girls versus boys, at that achievement level ( $\alpha=0.05$ ). Where there are three subgroups shown, e.g., high, medium and low decile schools, *grey italic* type indicates that this category is not included in the significance test.

*c* indicates that there are too few observations to provide reliable estimates (i.e., fewer than 30 students with valid data for this cell).

Due to rounding figures may not sum exactly to 100 percent.

**Table 7: Mean Index Scores for Selected Indices, from the PISA 2000 Study**  
(Results based on students' self-reports or reports from school principals)

Index	Māori High Achievers		Māori Medium Achievers		Māori Low Achievers		All Māori Students		OECD Countries	
	Mean Index Score	S.E.	Mean Index Score	S.E.	Mean Index Score	S.E.	Mean Index Score	S.E.	Mean Index Score	S.E.
<b>MOTIVATION &amp; ENGAGEMENT</b>										
Interest in Reading	0.29	(0.11)	<b>-0.22</b>	(0.06)	<b>-0.23</b>	(0.07)	<b>-0.08</b>	(0.04)	<b>0.00</b>	(0.00)
Engagement in Reading	0.21	(0.09)	<b>-0.26</b>	(0.05)	<b>-0.51</b>	(0.08)	<b>-0.19</b>	(0.04)	<b>0.00</b>	(0.00)
Reading Activities	0.21	(0.07)	<b>0.01</b>	(0.04)	<b>-0.16</b>	(0.13)	<b>0.02</b>	(0.04)	<b>0.00</b>	(0.0) i
Time Spent on Homework	0.02	(0.07)	-0.06	(0.06)	<b>-0.44</b>	(0.11)	<b>-0.13</b>	(0.04)	0.00	(0.00)
Engagement with School	0.12	(0.09)	0.26	(0.06)	-0.08	(0.08)	0.14	(0.05)	0.00	(0.0) i
<b>LEARNING STRATEGIES</b>										
Control Strategies	0.17	(0.09)	<b>-0.14</b>	(0.07)	<b>-0.47</b>	(0.07)	<b>-0.13</b>	(0.05)	0.00	(0.01)
Memorisation Strategies	0.26	(0.07)	0.19	(0.06)	<b>-0.04</b>	(0.09)	0.16	(0.04)	<b>0.00</b>	(0.00)
Elaboration Strategies	0.17	(0.08)	0.11	(0.06)	-0.01	(0.08)	0.10	(0.04)	<b>0.00</b>	(0.00)
Competitive Learning	0.42	(0.09)	<b>0.04</b>	(0.07)	<b>-0.01</b>	(0.08)	<b>0.13</b>	(0.04)	<b>0.00</b>	(0.00)
Co-operative Learning	0.43	(0.09)	0.40	(0.06)	0.20	(0.11)	0.37	(0.04)	<b>0.00</b>	(0.00)
<b>STUDENT SELF-CONCEPTS</b>										
Reading	0.25	(0.11)	<b>-0.15</b>	(0.07)	<b>-0.45</b>	(0.10)	<b>-0.10</b>	(0.05)	<b>0.00</b>	(0.0) i
Academic Ability	0.55	(0.08)	<b>-0.04</b>	(0.06)	<b>-0.14</b>	(0.08)	<b>0.10</b>	(0.05)	<b>0.00</b>	(0.0) i
Computer Ability	0.35	(0.09)	<b>0.12</b>	(0.06)	<b>-0.08</b>	(0.09)	<b>0.14</b>	(0.04)	<b>0.00</b>	(0.00)
<b>FAMILY BACKGROUND</b>										
Home Educational Resources	0.11	(0.08)	<b>-0.35</b>	(0.07)	<b>-0.96</b>	(0.11)	<b>-0.38</b>	(0.05)	0.00	(0.0) i
Parental Cultural Communication	0.20	(0.06)	<b>-0.03</b>	(0.05)	<b>-0.08</b>	(0.09)	<b>0.02</b>	(0.04)	<b>0.00</b>	(0.00)
Parental Social Communication	-0.27	(0.09)	-0.24	(0.07)	<b>-0.60</b>	(0.07)	-0.33	(0.05)	<b>0.00</b>	(0.00)
Family Educational Support	0.25	(0.08)	0.23	(0.06)	0.26	(0.08)	0.24	(0.04)	<b>0.00</b>	(0.0) i
Family Wealth	0.12	(0.07)	<b>-0.11</b>	(0.05)	<b>-0.20</b>	(0.07)	<b>-0.07</b>	(0.03)	0.00	(0.00)
<b>CLASSROOM FACTORS</b>										
Teacher Support	0.59	(0.08)	0.44	(0.06)	<b>0.16</b>	(0.10)	<b>0.41</b>	(0.04)	<b>0.00</b>	(0.01)
Teacher-Student Relations	0.18	(0.07)	0.01	(0.05)	<b>-0.17</b>	(0.08)	<b>0.01</b>	(0.04)	<b>0.00</b>	(0.0) i
Disciplinary Climate *	-0.09	(0.08)	-0.28	(0.06)	<b>-0.34</b>	(0.08)	<b>-0.24</b>	(0.04)	0.00	(0.01)
Schools' Educational Resources *	0.15	(0.12)	-0.04	(0.11)	-0.06	(0.12)	0.00	(0.09)	0.00	(0.02)
<b>WIDER SCHOOL ISSUES</b>										
Student-Related Behaviours *	-0.14	(0.09)	<b>-0.42</b>	(0.07)	<b>-0.49</b>	(0.10)	<b>-0.36</b>	(0.07)	0.00	(0.01)
Teacher Morale and Commitment	0.32	(0.14)	0.11	(0.11)	<b>0.01</b>	(0.13)	<b>0.14</b>	(0.10)	<b>0.00</b>	(0.01)
Teacher Shortages *	-0.25	(0.13)	-0.41	(0.10)	-0.25	(0.14)	-0.33	(0.10)	0.00	(0.01)
Teacher-Related Behaviours *	0.00	(0.10)	<b>-0.23</b>	(0.10)	-0.17	(0.13)	<b>-0.16</b>	(0.09)	0.00	(0.01)
Schools' Physical Infrastructure *	0.07	(0.10)	0.02	(0.11)	0.14	(0.13)	0.06	(0.09)	0.00	(0.01)

**Bold** type indicates the mean index score is statistically significantly different to the score for Māori high achievers on this index ( $\alpha=0.05$ ).

\* indicates that the index has been inverted so that lower values correspond to less positive reports on the factor being measured.

i indicates that the standard error has been imputed.

**Table 8: Percentage of Māori Students with Selected Educational Resources in the Home by Achievement Level, from the PISA 2000 Study**  
(Results based on students' self-reports)

Educational Resource	Māori High Achievers		Māori Medium Achievers		Māori Low Achievers		All Māori Students	
	%	S.E.	%	S.E.	%	S.E.	%	S.E.
A Dictionary	98.6	(1.0)	97.0	(1.2)	<b>88.6</b>	(2.3)	<b>95.4</b>	(0.9)
A Quiet Place to Study	94.2	(1.9)	<b>87.0</b>	(2.3)	<b>75.3</b>	(4.2)	<b>86.0</b>	(1.7)
A Desk for Study	83.3	(3.2)	79.2	(2.2)	<b>69.2</b>	(4.3)	77.9	(1.4)
Text Books	93.8	(2.0)	<b>84.4</b>	(2.2)	<b>69.3</b>	(4.8)	<b>83.2</b>	(1.3)
Three or More Calculators	76.4	(4.1)	<b>57.8</b>	(3.7)	<b>41.2</b>	(4.2)	<b>58.6</b>	(2.3)

**Bold** type indicates that the percentage is statistically significantly different to the percentage of Māori high achievers with this resource ( $\alpha=0.05$ ).

**Table 9: Mean Index Scores for Selected Indices Disaggregated by Gender, from the PISA 2000 Study**

(Results based on students' self-reports or reports from school principals)

Gender/Index	Māori High Achievers		Māori Medium Achievers		Māori Low Achievers		All Māori Students	
	Mean Index Score	S.E.	Mean Index Score	S.E.	Mean Index Score	S.E.	Mean Index Score	S.E.
<b>GIRLS</b>								
Interest in Reading	0.41	(0.12)	<b>-0.17</b>	(0.08)	<b>-0.45</b>	(0.13)	<b>-0.02</b>	(0.06)
Self-Concept in Reading	0.36	(0.12)	<b>-0.04</b>	(0.11)	<b>-0.64</b>	(0.23)	<b>0.00</b>	(0.07)
Teacher Support	0.72	(0.01)	0.60	(0.08)	<b>0.19</b>	(0.15)	0.57	(0.05)
Educational Resources *	0.18	(0.14)	-0.08	(0.11)	<b>-0.18</b>	(0.14)	<b>-0.01</b>	(0.10)
<b>BOYS</b>								
Interest in Reading	0.08	(0.17)	-0.28	(0.07)	-0.09	(0.07)	-0.15	(0.04)
Self-Concept in Reading	0.05	(0.18)	-0.28	(0.09)	-0.32	(0.10)	-0.22	(0.06)
Teacher Support	0.35	(0.15)	0.26	(0.08)	0.14	(0.13)	0.24	(0.06)
Schools' Educational Resources *	0.10	(0.20)	0.00	(0.16)	0.02	(0.13)	0.03	(0.12)

**Bold** type indicates the mean index score is statistically significantly different to the score for Māori high achievers for this index and gender ( $\alpha=0.05$ ).

\* indicates that the index has been inverted so that lower values correspond to less positive reports on the factor being measured.

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