



MINISTRY OF EDUCATION

Te Tāhuhu o te Mātauranga



Reading Achievement in New Zealand in 1990 and 2001: *Results from the Trends in IEA's Reading Literacy Study*



The 1990 study of the reading literacy of middle primary students, conducted by 27 countries, was repeated in 2001 by nine of those countries, including New Zealand.



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Reading Achievement in
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First published in 2005 by the:

Comparative Education Research Unit
Research Division
Ministry of Education
P O Box 1666
Wellington
New Zealand

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ISBN 0-478-13317-0

ISBN (Web) 0-478-13318-9

Opinions expressed in this report are those of the authors and do not necessarily coincide with those of the Ministry of Education.

Cover and Design: Riverline.

Desktop Publishing: Ministry of Education and Printlink.

Printed by: Printlink.

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Acknowledgements

The administration of the Trends in IEA's Reading Literacy Study in New Zealand involved a large number of people working together during different phases of the study. Without the efforts from these people, the study would not have been so successful. First and foremost, we would like to thank the students who participated in the Trends study, along with the teachers who coordinated and administered the assessment.

We would also like to thank our international colleagues for their support and very useful advice throughout the time that the project was running.

We also acknowledge the significant contribution made by Maurice Walker who was the National Research Coordinator from 1999-2002. Thanks to our former colleagues, Glenn Chamberlain and Fiona Sturrock, and to Jeremy Praat for their work on the various aspects of the study. We also acknowledge the work of our colleagues in the Research Division who contributed in many ways during the different phases of the project.

Finally, a special thanks to Christabel Dillon who managed the publication process for this report.

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Overview

The Trends in IEA's Reading Literacy Study was a partial replication of IEA's 1990-1991 study of reading literacy. The Trends study was conducted in conjunction with the Progress in Reading Literacy Study (PIRLS), the first in a regular cycle of studies, which is the subject of a separate report (published in 2004). The aim of this report is to present a descriptive summary of similarities and differences between the achievement in reading literacy of New Zealand Year 5 students in 2001 and that of their counterparts in 1990. Year 5 students' achievement is examined in both a national and international setting with reference to the home and classroom context in which reading activities occur.

This report is divided into six sections:

Chapter 1 provides an overview of the design of the Trends study, along with details of the implementation of the study in New Zealand.

Chapter 2 contains information on the reading achievement of Year 5 students in an international context with a particular focus on changes over time.

Chapter 3 focuses on changes in the background characteristics of students, including leisure activities.

Chapter 4 provides details of the home context of students, particularly resources and activities that would promote reading as a leisure activity along with how these have altered since 1990.

Chapter 5 contains information on Year 5 students' perceptions of the activities that they do in the classroom and changes in these over the decade.

A brief summary of the main findings concludes this report.

In 2001, nine countries including New Zealand administered the Trends in IEA's¹ Reading Literacy Study, hereafter referred to as the Trends study. This study was a partial replication of the 1990-1991 study of reading literacy achievement and was undertaken in order to examine trends in achievement over the decade. The Trends study was conducted in conjunction with the Progress in International Reading Literacy Study (PIRLS). PIRLS will be used in the future to measure trends in achievement in five-yearly cycles. This report presents the New Zealand results from the Trends study.²

Key Points

- In order to examine trends in reading literacy, New Zealand participated in the Trends in IEA's Reading Literacy Study, a partial replication of the 1990-1991 IEA Reading Literacy Study.
- Nine countries, including New Zealand, took part in the Trends study in 2001.
- New Zealand Year 5 students were assessed in the Trends study using the same instruments as in 1990. In addition, contextual information was collected from the students by way of questionnaires.

Background

In 2001, the International Association for the Evaluation of Educational Achievement (IEA) began a regular cycle of assessment of the reading literacy of Grade 4 (Year 5) students with the first data collection for the Progress in International Reading Literacy Study (PIRLS). Eleven years prior to this, New Zealand was involved in the IEA Reading Literacy Study, conducted in 1990 and 1991.³ Although PIRLS was built on this earlier study, there were significant differences between the two studies, which meant that the findings from each of them could not be linked. In order to measure changes in reading achievement that may have occurred over the previous decade, nine of the 35 countries participating in PIRLS-01⁴, including New Zealand, re-administered the original reading test used in the 1990-1991 study. The resulting study, known as the Trends in IEA's Reading Literacy Study, will not be repeated in later cycles of PIRLS.

¹ For details of IEA see Appendix A.1.

² For information on the New Zealand results from the PIRLS study conducted in 2001 see Caygill and Chamberlain (2004). International results from PIRLS are reported in Mullis, Martin, Gonzalez and Kennedy (2003).

³ Note that the Reading Literacy study was conducted in New Zealand and other Southern Hemisphere countries in 1990; Northern Hemisphere countries conducted the study in 1991.

⁴ PIRLS-01 is used to refer to the Progress in Reading Literacy Study conducted in 2001. The designation PIRLS is used to refer to aspects of the study which are expected to remain unchanged over subsequent cycles.

The results of the 1990-1991 study led Professor Warwick Elley to comment that:

“New Zealand children were found to be reading very competently, well above the international average, and well above expectation. Kiwi-style approaches to the teaching of literacy were generally found to be effective when compared to other methodologies.” (foreword to Wagemaker, H. (Ed.), 1993).

However, Elley noted that the results were not all positive and that the study identified areas for improvement or investigation within the New Zealand context. The 2001 repeat of the earlier study evaluates any changes over the decade in the reading literacy of Year 5 students as well as detailing changes in background characteristics and reading habits of these students.

Implementation

The Trends study was conducted in association with PIRLS-01. A project consortium comprised of a number of international organisations was lead by the *International Study Centre* at Boston College, in Massachusetts, the United States. *Statistics Canada* in Ottawa, Canada was responsible for the sampling in each country. The *IEA Data Processing Centre* in Hamburg, Germany was responsible for data management at the international level.

In each participating country a national study centre implemented the study. In New Zealand, the Comparative Education Research Unit within the Ministry of Education’s Research Division was the national centre.

Test administration in New Zealand

The Trends study was administered near the end of the school year in participating countries. In New Zealand, as with other Southern Hemisphere countries, the test was administered over October and November 2001, while Northern Hemisphere countries administered the test over April and May of that year. Teachers in the participating schools administered the test.

Country participation

Nine of the 35 countries that participated in the first cycle of PIRLS also opted to participate in the Trends in IEA’s Reading Literacy Study. The list below presents the countries involved in the Trends study.

Greece	Italy	Slovenia
Hungary	New Zealand	Sweden
Iceland	Singapore	United States

Framework

As the assessment instruments used in the Trends study were the same as those used in the IEA Reading Literacy Study, the framework remained unchanged. A summary of the framework details is presented below. For further information on the framework see Appendix A.2 or Martin, Mullis, Gonzalez, and Kennedy (2003, pp. 58-60).

A definition of reading literacy

Reading literacy was defined for the purposes of the 1990-1991 study as:

“...the ability to understand and use those written language forms required by society and/or valued by the individual.” (Elley, 1992, p.3)

The framework details

The Reading Literacy Study included three domains or types of materials: narrative prose, expository prose, and documents. The *narrative texts* included continuous prose passages, either fact or fiction, where the writer's aim was to tell a story. Generally, the intent of these narrative texts was to involve the reader emotionally or to entertain. Written in the past tense, they usually had people or animals as their main focus or theme. The *expository texts* included more formal texts written with the intention of describing or explaining something in the material world. This type of writing featured such elements as definitions, causes, contrasts, examples and functions. The *document texts* included documents such as charts, forms, graphs, maps, timetables and directories. The reading skills most often associated with these materials involved the ability to locate information or follow directions. A selection of texts and questions used in the assessment is presented in A.4 in Appendix A. In addition to the three text types, the Reading Literacy Study included a word recognition test at the Year 5 level. This was administered as a speeded test and required students to match individual words with pictures.

Questions were classified in the blueprint for the assessment based on five comprehension processes. Three of these comprehension processes, *verbatim*, *paraphrase* and *inference* were used in relation to the narrative and expository texts, while the other two, *locate information* and *locate and process* were used in relation to document texts. Questions were classified as *verbatim* where the answer could be found in the text in much the same wording as in the question. *Paraphrase* questions required students to recognise or paraphrase the answer in the text in different wording from that of the question. Questions classified as *inference* required students to go beyond the information given and make an inference to arrive at the correct answer. Questions associated with the document texts required students either to merely *locate information* in the text or to *locate and process* information in the text (that is to count, compare or infer).

Measures and instrumentation

The Trends study comprised only part of the previous IEA Reading Literacy Study. Since the Trends study was designed to give an indication of change in Grade 4 (Year 5) students' achievement during this time, the student instruments from the previous study were administered. None of the previous school or teacher questionnaires were administered.

The test consisted of two student booklets containing mostly multiple-choice questions. The first booklet was administered over 35 minutes, while the second booklet was assigned 40 minutes of testing time. Following the assessment, students were given a background questionnaire to complete. For further details about the test instruments, see Appendix A.2.

Population definition

In order to measure trends since 1990, the population definition used at that time was retained for the 2001 Trends study. The international desired target population was defined as:

“All students attending school on a full-time basis at the grade level in which the majority of students are ages 9 years to 9 years 11 months at the eighth month of the school year.” (Wagemaker, 1993, p. 24)

In 1990 the defined national target population for New Zealand was *all students attending school in “standard 3” on a full-time basis*. As the class-level nomenclature was used infrequently in schools in 2001, the target population definition was:

All students who were scheduled to begin secondary school (Year 9/Form 3) in 2005.

The new definition still referred to students who would once have been called standard 3 students. These students were usually Year 5 students and will be referred to as such throughout this report.

Sampling method

Essentially, the same approach was used for the two assessments with schools selected at random from a stratified sampling frame using probability proportional to size. From within each of the selected schools, a class at the appropriate age and class level was selected. Participation rates for 1990 and 2001 are shown in Table 1.1.

1990

The sampling method used in 1990 is summarised in Wagemaker (1993). The sample was stratified according to location (area within the country) and school type (full primary or contributing). For further details see Table A.3.1 in Appendix A. While exclusions were permitted, they were required to be kept to a minimum with the result that three percent of the student population were excluded from the study. The sampling referee for the 1990 study, Dr Kenneth Ross of Deakin University, was responsible for establishing sampling procedures and monitoring the results.

As a result of the sampling process, 176 New Zealand schools and 3016 students took part in the 1990 study of reading literacy.

2001

The 2001 study was conducted in conjunction with the PIRLS-01 study so both samples were drawn simultaneously. From within the selected schools, classes with Year 5 students were selected randomly to take part in the study. The selected class or group of Year 5 students took part in either the Trends study or PIRLS-01. As a result of this selection process, 73 New Zealand schools, and 1188 students took part in the Trends study (see Table 1.1). For further information on the sampling process see Appendix A.3.

As with the 1990 study, countries were able to exclude schools and students from the assessment with the requirement that exclusions were to be kept to a minimum - the overall exclusion rate for New Zealand in 2001 was three percent. Statistics Canada, in consultation with the PIRLS sampling referee, Keith Rust of Westat Inc., rigorously monitored the sampling and exclusion process. All countries had at least one school that declined to participate in the study so replacement schools were used to meet sampling requirements. It is important to remember that schools decline to participate for various reasons and not necessarily based on performance. At the time of drawing the sample, two schools were identified as replacements for each selected school, with each replacement school having very similar student populations to the selected school. The sampling methodology therefore ensured that the population estimates of achievement for participating countries are likely to be as *good* as the population estimates if all sampling requirements had been achieved. For participation rates for the nine Trends study countries see Table A.3.3 in Appendix A.3.

Table 1.1: Participation in the 1990 Reading Literacy Study and the Trends study in 2001

Participants	1990 Reading Literacy Study
schools	176
students	3016

Note: The exclusion rates for both 1990 and 2001 were 3%.

Key findings from 1990-1991

Key findings from 1990-1991 are presented below, firstly in an international context and then in the New Zealand context. The Trends study was only a partial replication of the earlier study, collecting only student-level data. However the teacher and school contextual findings from 1990-1991 are also detailed here for your information.

International findings (Elley, 1992)

- Finnish students⁵ in general showed the highest reading literacy levels for the 27 participating countries, followed by students from the United States, Sweden, France, Italy, New Zealand, and Norway in that order. New Zealand students on average achieved about the same as French and Italian students but lower than those in Finland, the United States and Sweden.
- Compared with other countries, New Zealand's mean performance was higher on *narrative* texts, but lower on *expository* texts and *documents*.
- New Zealand's mean achievement was above the score value predicted by the Composite Development Index (CDI)⁶. Furthermore, New Zealand, Italy, Singapore, and Hong Kong achieved relatively higher standings in terms of rankings than was predicted by the CDI.
- The mean achievement of girls was higher than that of boys in all countries. The difference between the mean achievement of girls and boys was widest on *narrative* texts, and smallest on the *document* texts. For three of the six countries with the largest gender difference – Ireland, New Zealand, and Trinidad and Tobago – formal reading instruction began at age five years.
- Across all countries in the study, children whose home language was different from that of the language of instruction achieved, on average, lower scores than those children whose home language was the same. The largest difference between the means for these two groups of children was in New Zealand.
- Factors which consistently differentiated high-scoring and low-scoring countries were large school libraries, large classroom libraries, regular book borrowing, frequent silent reading in class, frequent story reading aloud by teachers, and more scheduled hours spent teaching the language.

⁵ Finland was not a participant in the Trends study.

⁶ The Composite Development Index (CDI) was designed to compare the economic and cultural contexts of literacy education across countries. The CDI was created by combining six national indicators, using equal weighting for all indicators. These indicators were GNP per capita, public expenditure per student on education, life expectancy, the percentage with low birth weight, newspapers per 1000 population, estimated proportion of adult literacy. These indicators were chosen because they were believed to provide indirect support to the promotion of literacy levels in schools, over and above the quality of their teaching programmes. A good economy has the potential to supply better resources, good health to provide fewer barriers to learning, and the availability of newspapers and literate adults potentially indicates the importance of literacy to the nation (Elley, 1994).

- A number of factors appeared to have little relationship to reading literacy achievement. There was no apparent difference in reading achievement between countries which had high enrolment ratios in pre-school and those that did not. Those countries where there was a practice of keeping teachers with the same class throughout successive grades did not appear to differ in reading achievement from those who did not have this policy. The size of class, numbers of multi-level (composite) classes, and the length of the school year all appeared to have little relationship with reading achievement.
- Those students who watched television for more than 3.5 hours per day tended to achieve lower reading scores than those who watched less. The exceptions were found in countries where imported films with subtitles in the local language were often shown. In these countries (e.g. Italy and Sweden), children who watched television for three to four hours daily tended to achieve higher reading scores.
- The amount of voluntary reading that students reported was positively related to their achievement levels.
- The opinions of what makes a good reader varied across countries even amongst the best readers. The differences were believed to reflect variations in teaching emphases.

New Zealand findings (Wagemaker, 1993)

New Zealand students with a high level of reading literacy achievement, as measured by the overall mean achievement score, were characterised as: likely to be female, Pakeha/European, and have a high self-rating of their own reading ability. They were likely to come from a home where there were many possessions, they ate regular meals, and English was spoken all of the time.⁷ The students were also likely to interact with others at home, watch less television than other students, read aloud at home, do more homework than other students, borrow books from a school or public library, and engage in more voluntary reading activities than other students.

Although the influence of the community, schools and teachers were less important than student characteristics, they did have some bearing on the students' performance. Students who achieved well were likely to have teachers who read a variety of books as well as articles on teaching and on reading and to have had in-service training in the teaching of reading. In the classroom these teachers were likely to:

- support a policy of improving students' comprehension ability by involving students in reading activities such as dramatising stories, orally summarising students' reading, relating experiences to reading, making predictions during reading, looking for the theme or message, making generalisations or inferences and comparing pictures and stories;
- assess low-order skills by testing word recognition, vocabulary, sentence understanding and decoding skills;
- use instructional strategies to encourage students to read more and use the library more;
- take students' interests into account by informally assessing students' interests;
- pay attention to phonics when teaching reading (this included teaching students letter-sound relationships as well as word-attack skills);
- frequently assign and check reading homework.

Schools with a high number of students needing remedial help but not receiving it, as perceived by the teacher, were more likely to have lower scoring students than schools with fewer of these students. Schools with a high specialist teacher/pupil ratio were more likely to have lower scoring students than schools with a low specialist teacher/pupil ratio.

⁷ The assessment was conducted only in English in New Zealand.

Presentation and reporting of results

In order to compare the results from the 1990-1991 IEA Reading Literacy Study with those from the 2001 Trends study, the student results from both studies were placed on a common scale. The Item Response Theory (IRT)⁸ scaling methodology was used to develop comparable estimates of performance for all students. The application of the IRT scaling and plausible value methodology to the assessment data involved combining characteristics of the items, data from the questionnaires, and student performances to obtain these estimates of performance. Using the values generated from the IRT and plausible values methodology, the achievement results from 2001 were placed on a scale with a mean of 500 and a standard deviation of 100. The 1990-1991 data was then re-scaled relative to this common scale.

For the majority of figures and tables reporting on contextual information data are “adjusted” so that students with missing values are excluded from calculations. That is, means and proportions presented in tables and graphs represent only those who completed the context question or questions under discussion. In general, around one to three percent of students had missing values for each question. For questions where the proportion of students with missing values exceeded three percent, the proportion is noted below the table.

Much of the context data relies on self-reporting, which introduces some uncertainty into the results. However, questions were written in such a way as to keep this introduced bias to a minimum,⁹ while standard errors are used to aid the interpretation of collected data. In addition, where comparisons are made with other countries, it is the relative nature of the results that is examined rather than particular proportions.

This report illustrates the similarities and differences between groups using basic descriptive analyses. No attempt has been made in this report to demonstrate or prove that particular contextual conditions **cause** particular reading achievements. Where achievement results are presented with reference to context these merely show an association between achievement and context variables.

⁸ For further details of the Item Response Theory (IRT) scaling methodology used in the Trends study see Gonzalez (2003). A summary of some of the information found in the technical report can also be found in the Technical Notes at the end of this report.

⁹ The original questions were also trialled prior to testing in 1989, and refined in order to reduce bias and errors.

2

Trends in Reading Literacy Achievement

This chapter presents an overview of the changes in reading performance from 1990-1991 to 2001 for New Zealand and the other eight participating countries. It also looks at changes in performances in the reading domains that were under scrutiny – narrative, expository, and document texts.

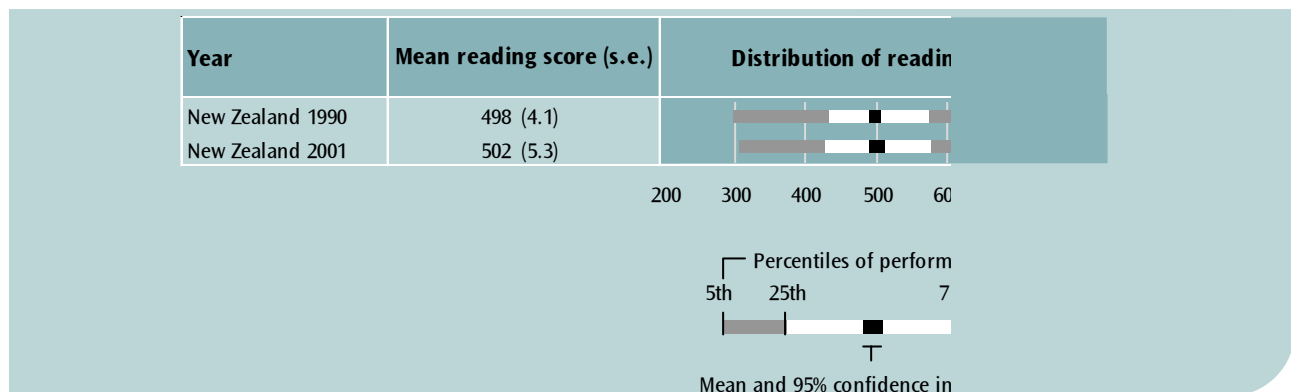
Key points

- There was no significant change in the mean performance of New Zealand Year 5 students between 1990 and 2001.
- The distribution of New Zealand students’ reading scores was as large in 2001 as in 1990.
- Year 5 students’ mean performance on document texts increased significantly over the period, but there was no change on either narrative texts or expository texts.

Trends in Year 5 students’ reading literacy achievement

The overall mean performance of Year 5 students in 2001 was about the same as in 1990. Furthermore, the distribution of scores remained unchanged over this period (see Figure 2.1). Given that there have been changes in the demographic composition of the student population over this period, as detailed in Chapter 3, the fact that the profile of scores changed little over the decade, could be regarded as one of the positive findings from this study.

Figure 2.1: Reading literacy achievement of Year 5 students in 1990 and 2001



Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.

Source: Martin, Mullis, Gonzalez, & Kennedy (2003).

In Chapter 1, it was stated that the achievement data from the 1990-1991 study were re-scaled using the IRT scaling methodology used in recent IEA studies (for details see Technical Note TN 1 or Gonzalez, 2003). As a consequence, the mean scores for 1990-1991 shown in this report are numerically different from those reported in Elley (1992) and Wagemaker (1993).¹⁰ However, while the scores are numerically different, the country rankings remain the same.

As shown in Table 2.1, Greece, Slovenia, Iceland, and Hungary all showed statistically significant¹¹ increases in mean reading achievement over the 10-year period, while Sweden showed a significant decrease in reading achievement. Italy, Singapore, New Zealand, and the United States showed no significant change in mean reading achievement over the time.

Table 2.1: Mean reading literacy scores for the Trends study countries in 1990-1991 and 2001

Countries	1990-1991		20
	Mean reading score (s.e.)	Mean age	Mean reading score (s.e.)
Greece	466 (4.5)	9.3	507 (5.9)
Slovenia	458 (3.2)	9.7	493 (3.7)
Iceland	486 (1.5)	9.8	513 (3.5)
Hungary	459 (4.0)	9.3	475 (3.9)
Italy	500 (5.4)	9.8	513 (4.4)
Singapore	481 (3.6)	9.3	489 (7.9)
New Zealand	498 (4.1)	10.0	502 (5.3)
United States	521 (3.2)	10.0	511 (6.3)
Sweden	513 (4.2)	9.8	498 (3.9)

Key: ▲ The mean for 2001 is significantly higher than the mean for 1990-1991.
▼ The mean for 2001 is significantly lower than the mean for 1990-1991.
● The means for 1990-1991 and 2001 are not significantly different.

Note: New Zealand and other countries on a southern hemisphere timeline administered the Reading Literacy Study in late 1990. Countries on a northern hemisphere timeline administered the study in early 1991. All countries administered the Trends study in 2001.

(s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.

Some results may appear inconsistent due to rounding.

Source: Martin, Mullis, Gonzalez, & Kennedy (2003).

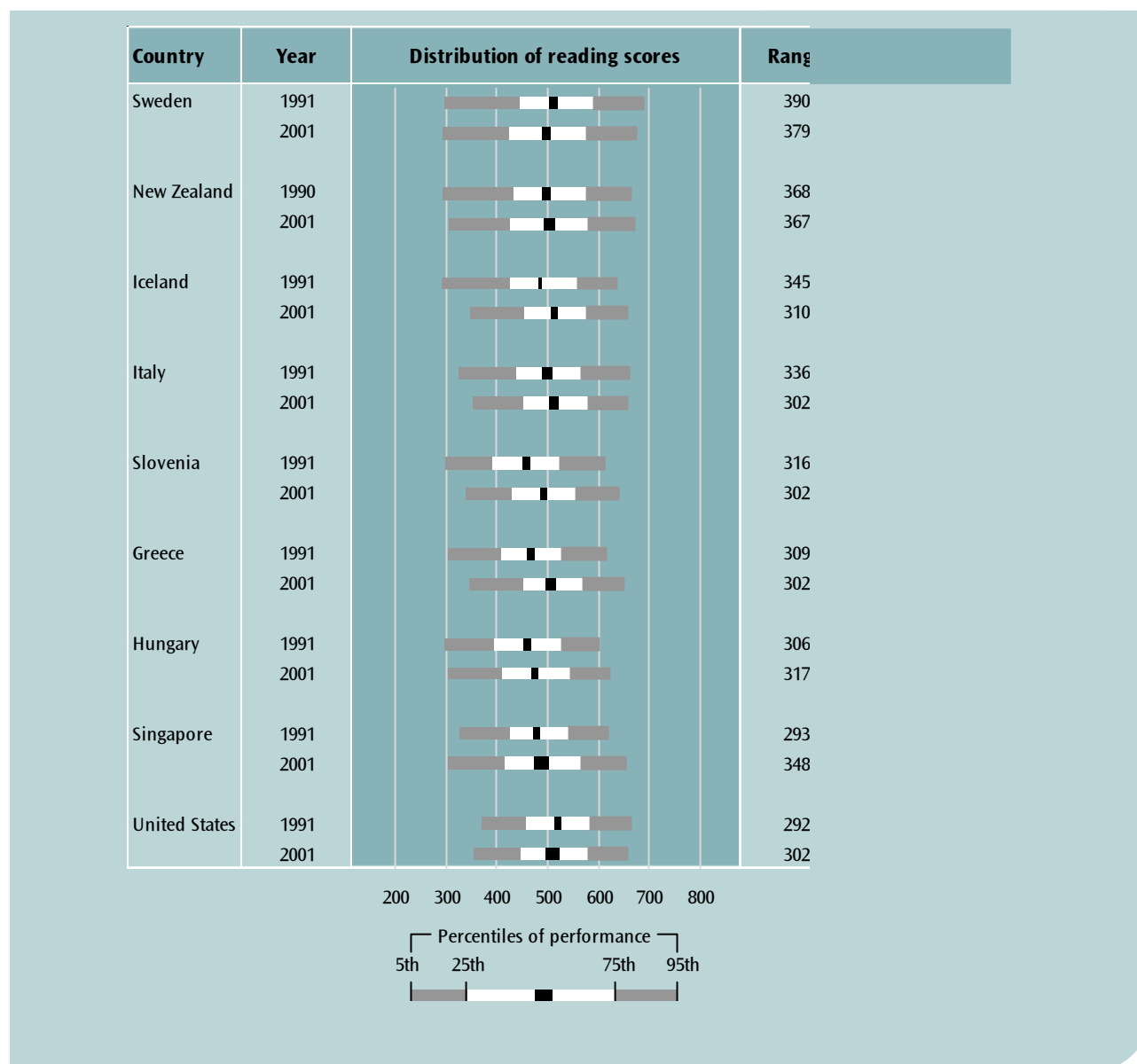
For some of the Trends study countries changes in their mean achievement were accompanied by a change in the distribution of scores, while for others there was no change. In New Zealand the range, the difference between the 5th and 95th percentiles, was virtually the same in 1990 (368) as in 2001 (367). In three countries, Singapore, the United States, and Hungary, the range increased, while in the other five countries the range decreased. However, it is the size of the increase in the range of scores for Singapore which is of particular interest. The range of scores for Singaporean students increased 56 scale score points from 293 in the earlier study to 348 in 2001, equivalent to about one-half of a standard deviation. However, while the range widened for Singapore, the mean did not change. Relatively small increases in the range were observed for Hungary (12 scale score points) and the United States (10 scale score points), but only the mean for Hungary changed; for the United States, the mean did not change. Iceland and Italy recorded relatively large decreases in their ranges (approximately one-third of a standard deviation in each country). The decrease in Iceland's range was coupled with an increase in the mean, while in Italy the mean did not change significantly. Figure 2.2 presents the distribution for each of the Trends study countries for 1990-1991 and 2001.

¹⁰ Wagemaker H. (Ed.) (1993) reports the New Zealand results from the 1990 Reading Literacy Study.

¹¹ This difference was statistically significant at the five percent level. Hereafter, any statistically significant differences will be reported in the text as significantly different (see TN2.2 in the Technical Notes for more details).

Compared to the other eight countries, New Zealand had the second largest range in reading achievement in 1990-1991, with the difference between the 5th and 95th percentiles calculated at 368 scale score points. Only Sweden had a larger range, 390 scale score points, while the United States had the smallest range, 292 scale score points. In 2001, Sweden still had the largest range at 379 scale score points followed by New Zealand with a range of 367 scale score points, and with Greece, Italy, Slovenia, and the United States having notably smaller ranges at about 302 scale score points.

Figure 2.2: Distribution of reading literacy scores for the Trends study countries in 1990-1991 and 2001



Note: The range refers to the difference between the 5th and 95th percentiles. For values, see Table B.1 in Appendix B.

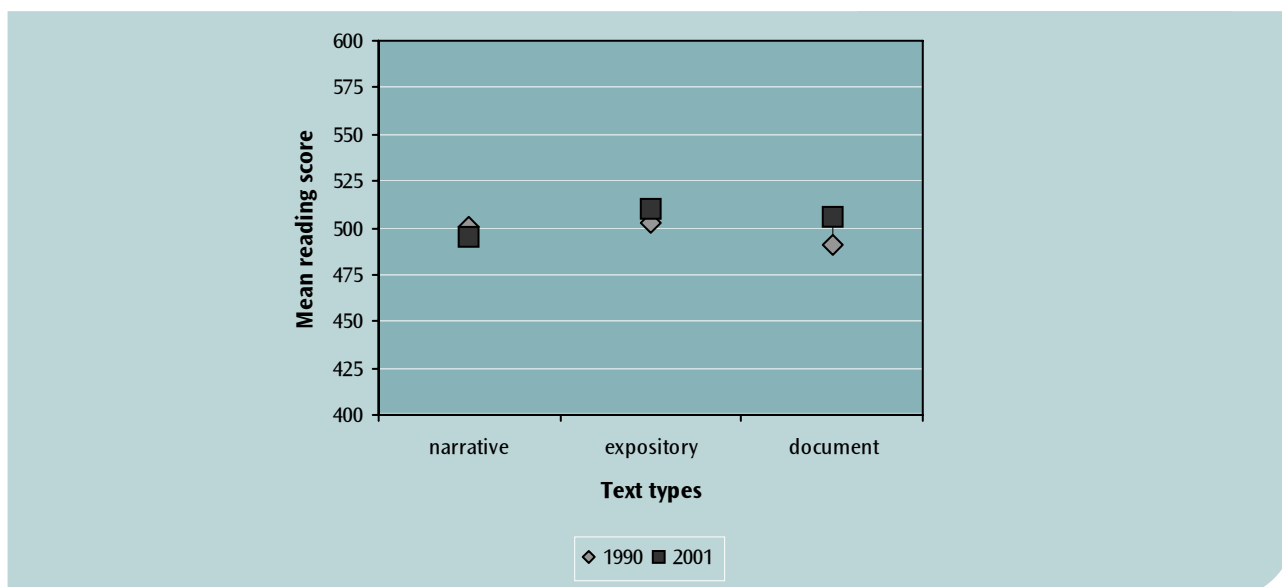
It is worth noting that the mean reading score for New Zealand students in 1990-1991 was significantly lower than that of United States and Swedish students, and significantly higher than students in Iceland, Singapore, Greece, Hungary, and Slovenia. However the results in 2001 show that the difference between some countries has reduced with the mean achievement of Year 5 students not significantly different from middle primary students in all countries except Hungary (see Table B.2 in Appendix B for values).

All countries tested the **same** grade-level as they had in 1990-1991 but in some countries the mean age of students at this grade-level had changed (see Table 2.1). The average age of students was slightly older in Greece, Slovenia, Hungary, and Italy in 2001, while in Singapore the mean age was slightly younger. In particular, the mean age of students had increased in Greece by more than half a year.

Trends in achievement on each reading literacy domain

As mentioned in Chapter 1, the Trends study included three domains: narrative prose, expository prose, and documents. As mentioned earlier on page 3, a sample of texts and questions used in the assessment can be found in Appendix A.4. Since each of these three domains was associated with different texts in the assessment, student achievement was examined separately for each text type. While New Zealand students' mean achievement on the narrative and expository texts has stayed the same, it improved significantly on document texts (see Figure 2.3).

Figure 2.3: Year 5 students' mean scores on narrative, expository, and document reading texts in 1990 and 2001



Note: The difference between the mean scores on the document texts is significant while the differences on the narrative and expository texts are not (t-values 2.45, -0.68, 1.23 respectively). For values, see Table B.3 in Appendix B.

Italian and Singaporean students' performances on document texts in 2001 were also significantly higher than that of their 1990-1991 counterparts. In 1990-1991, document reading was found to be an area of relative weakness for students in New Zealand and the aforementioned countries compared with their narrative and expository text reading. As was the case with New Zealand, there was no significant change in the performances on narrative and expository texts from 1990-1991 to 2001 in Italy and Singapore. (See Table B.3 in Appendix B). Students in Greece, Iceland, Slovenia, and Hungary performed better on average, on all text types in 2001 than their counterparts in 1991. Students in Sweden and the United States tended to achieve significantly lower scores on narrative texts in 2001 than their 1991 counterparts, while Swedish students were generally less successful on expository texts in 2001 than in 1991.

3

Trends in Year 5 Student Characteristics, Reading Behaviours and Attitudes

This chapter presents contextual information collected from middle primary students participating in the Trends in IEA's Reading Literacy Study. To complement the achievement information presented in Chapter 2, the discussion focuses firstly on the demographic characteristics of the students in the two assessments, and then on any changes that may have occurred in students' reading behaviours including their voluntary reading activities over the 11 years. An indication of the relationship between background variables and mean achievement is also given.

Key points

- Boys' and girls' achievement in 2001 was about the same as the performance of their respective 1990 counterparts.
- Students in the *Other* ethnic grouping were the only group to show an increase in achievement over the decade. There was little change in the achievement of Pakeha/European, Maori, and Pasifika students.
- Proportionately more Year 5 students reported that they seldom spoke English at home in 2001 than in 1990. However, the difference in achievement between students who frequently spoke English in the home, and those who rarely did, decreased over the 11-year period.
- Year 5 students were more likely to attend large schools in 2001 than in 1990, but there was no notable change in the performance of students in these large schools.
- Year 5 students' reports of the frequency of reading books for fun changed little over the 11-year period.
- In 2001, Year 5 students were generally watching less television than their counterparts were in 1990.
- Year 5 students in 2001 were more likely to rate themselves as very good at reading than students in 1990.

Demographic characteristics

Age

Table 3.1 presents the age statistics for Year 5 students in the 1990 Reading Literacy Study and the Trends in IEA's Reading Literacy Study in 2001. The table shows that students in both assessments had the same mean age and a similar range of ages.

Table 3.1: Age statistics for Year 5 students in 1990 and 2001

Age statistics	1990	2001
mean age	10 years 0 months	10 years 0 months
median age	10 years 0 months	10 years 0 months
range [®]	9 years 6 months to 10 years 6 months	9 years 6 months to 10 years 6 months

Note: [®] The range refers to the difference between the 5th and the 95th percentiles.

Gender

Table 3.2 presents information on the proportions of girls and boys in the study in 1990 and 2001, along with the proportions of girls and boys in the population. As shown in the table, the proportions of girls and boys in the achieved sample were representative of girls and boys in the New Zealand population at the assessed class level.

Table 3.2: Proportions of Year 5 girls and boys in 1990 and 2001

Population	1990		2001
	Estimated percentage in Reading Literacy Study	Actual percentage in standard 3	
girls	47 (1.1)	48	48
boys	53 (1.1)	52	52

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.

Source: Ministry of Education (1990, 2002a).

Ethnicity

In both 1990 and 2001, ethnic identity information was collected from students and then grouped, according to the Statistics New Zealand hierarchical procedure,¹² into four broad categories: Pakeha/European, Maori, Pasifika, and *Other* ethnic groups. In recent assessment studies (e.g. TIMSS, PISA) information has been reported separately for Asian students, however, in 1990 it was not possible to do so because the proportion of students in this category was relatively small. Students who identified themselves as Asian were, therefore, included in the *Other* ethnic category. For trend purposes, the same classification used in 1990 was used for the 2001 data. In 2001 ethnicity information for participating students was also obtained from schools. For reporting purposes it was decided that the information from the latter source would be used when describing the 2001 achievement results. This is also consistent with the reporting of the achievement results from the Progress in

¹² See Statistics New Zealand's *Standard Classification of Ethnicity* (1996) for details.

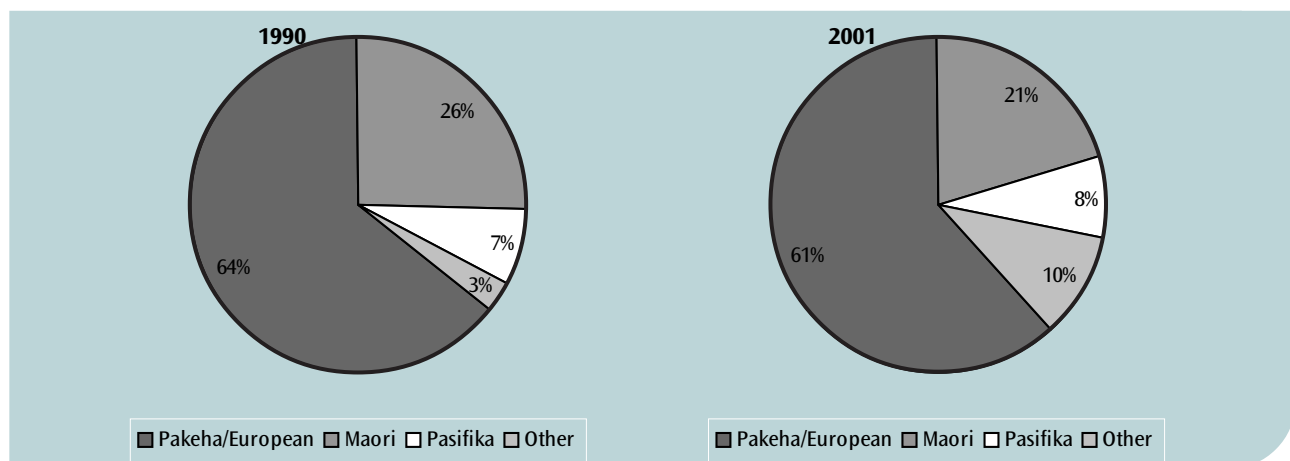
International Reading Literacy Study in 2001. Specifically, the four ethnic categories used are:

- *Pakeha/European* - refers to people predominantly of British or Irish background, or other European such as Dutch, Croatian, Greek, Polish, Italian, and German;
- *Maori*;
- *Pasifika* (including Samoan, Cook Island Maori, Tongan, Niuean);
- *Other ethnic groups* (including Chinese, Indian, Korean, Iraqi, Assyrian, Somali, and Chilean).

The increase in the diversity of the student population in terms of ethnic composition is one of the most notable changes to have occurred in New Zealand schools since 1990. According to the Minister of Education's *School Sector Report*, while the proportion of Maori students (currently about 20%) remained fairly stable over recent years, the proportions of Asian and Pasifika students increased, with Asian students in 2001 comprising six percent and Pasifika students eight percent of the total school population (Ministry of Education, 2002b). These changes were also reflected in the composition of the population at the middle primary level, particularly the increase in the proportion of Asian students. For example in 1994, this being the first year for which the proportion of Asian students was reported in *Education Statistics of New Zealand*, the proportion of Asian standard 3 students was three percent; in 2001 the proportion of Asian nine-year-olds was five percent (Ministry of Education, 1995 & 2002a).

Figure 3.1 presents the ethnic composition of the student body in each of the Reading Literacy and Trends studies. It is important to remember that for the 1990 study, the ethnic composition reflects students' self-reporting from a weighted sample of students, while the 2001 study reflects school-level reporting (mostly based on parent/guardian identification) for a weighted sample. The changes in the school population over the previous decade were also reflected in the ethnic composition of the student group in the two studies. The most notable change occurred in the proportion of students in the category *Other ethnic groups* – three percent in 1990 to 10 percent in 2001. This increase largely reflects the increase in the proportion of Asian students over the period.

Figure 3.1: Proportions of Year 5 students in each ethnic grouping in 1990 and 2001



Population values:

1990 (standard 3 at 1 July) – Maori 21% and Pacific Islands 7%. No values available for Pakeha/European, Asian, or Other ethnic groups (Source: Ministry of Education, 1991)

2001 (nine-year-olds at 1 July) – Pakeha/European, 63%; Maori, 22%; Pasifika, 9%; Asian, 5%; and Other ethnic groups, 1%. (Source: Ministry of Education, 2002b)

Note: Adjusted percentages are shown. Missing ethnicity data for 3% of students in both 1990 and 2001.

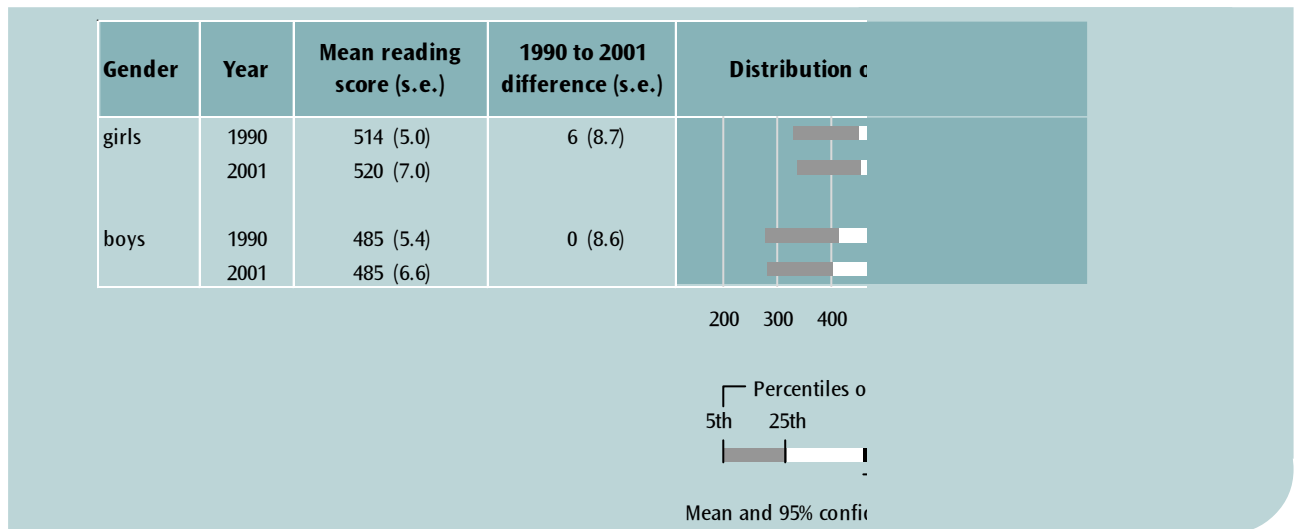
Trends in reading literacy achievement and gender

The 1990-1991 study found that the mean achievement of girls was higher than that of boys in all 27 countries.¹³ For three of the six countries with the largest gender difference – Ireland, New Zealand, and Trinidad and Tobago – formal reading instruction began at age five years (Elley, 1992).

There was only a very small, non-significant increase in the mean performance of Year 5 girls over the 11-year period and no observable change for Year 5 boys (see Figure 3.2). Furthermore, for boys the distribution of achievement scores was essentially the same in 2001 as it was in 1990, with just a small decrease at the 25th percentile (i.e. 25% of boys scored below 416 in 1990 while the same proportion scored below 404 in 2001). The corresponding scores at the other percentile points for boys were about the same in 2001 as in 1990. For girls the distribution in 2001 was also virtually the same as in 1990, with the only notable change occurring at the 95th percentile (i.e. top 5% of girls). At this point, the corresponding score increased from 668 to 681. The ranges, as measured by the difference between the 5th and 95th percentiles, were about the same for boys in both assessments (379 in 1990 and 382 in 2001) and for girls in both assessments (337 in 1990 and 342 in 2001).

As was the case in 1990, Year 5 girls in 2001, achieved on average higher scores (520) than Year 5 boys (485), with the difference between means of significance. The difference in 1990 was 29 scale score points, and although the difference had increased to 35 scale score points in 2001, this increase was found not to be statistically significant.

Figure 3.2: Reading literacy achievement of Year 5 students in 1990 and 2001, by gender



Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.

The girls' mean was significantly higher than the boys' mean in both assessments. See Table C.1 in Appendix C for the magnitude of these differences. Also see Table C.2 in Appendix C for percentile values.

Source: Martin, Mullis, Gonzalez, & Kennedy (2003).

In 2001, with two exceptions, significant gender differences in mean achievement favouring girls were still observed in the Trends study countries. The two exceptions were Italy and Iceland where the difference between girls' and boys' mean achievement was not significant. Both countries recorded a substantial decrease in the magnitude of the difference over the decade – for Iceland a significant decrease from 28 scale score points in 1991 to just nine scale score points in 2001, and for Italy a non-significant decrease, from 17 scale score points to just four scale score points. It is interesting to note that in the PIRLS-01 study, Italy recorded the smallest gender difference – just eight scale score points compared with the international average of 20, while the difference observed for Iceland was around the international average at 19 scale score points. See Mullis, Martin, Gonzalez and Kennedy (2003) for further details.

¹³ According to Wagemaker, Taube, Munck, Kontogiannopolou-Polydorides, and Martin (1996), not all of the differences were found to be statistically significant at the 5% level.

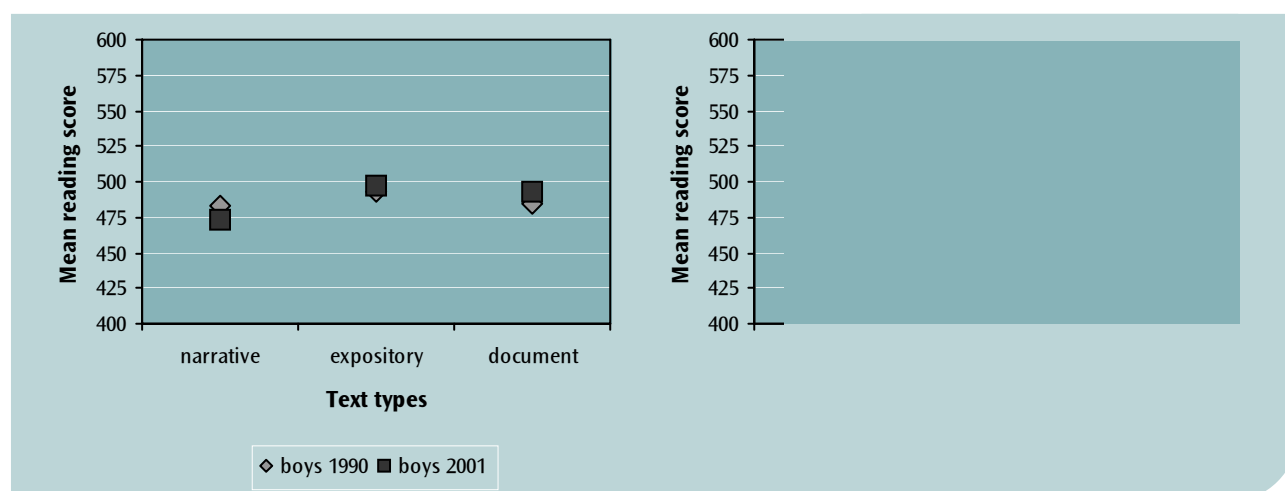
Achievement on each reading literacy domain and gender

Compared to their performance in 1990, Year 5 girls' performance in 2001 was about the same on *narrative* texts (521 cf. 518) and slightly higher on *expository* texts (515 cf. 524). Consistent with the increase on *documents* for all New Zealand students, girls in 2001 on average achieved a score 21 points higher on *documents* than girls in 1990 (i.e. a mean of 499 in 1990 cf. 520 in 2001).

For boys there were only small, non-significant changes in their performance in each of the three domains. On *narrative* texts, the mean score for boys in 2001 was nine points lower than the mean for their 1990 counterparts (i.e. 474 cf. 483 respectively), while for *documents* the mean in 2001 was nine score points higher than in 1990 (i.e. 484 cf. 493). The mean scores on *expository* texts were about the same for both years (492 cf. 497). See Figure 3.3.

Mirroring the overall gender difference in reading performance, New Zealand boys performed significantly lower than New Zealand girls on each text type in both 1990 and 2001. In both 1990 and 2001, the difference between boys' and girls' mean achievement was greater on the *narrative* texts than on the other domains (i.e. differences of 38 and 45 scale score points for each assessment respectively – see Table C.3 in Appendix C for further details).

Figure 3.3: Mean scores for Year 5 girls and boys on narrative, expository, and document reading texts in 1990 and 2001



Note: The difference between 1990 and 2001 on the document texts for girls is significant; all other differences are not significant. For values, see Table C.3 in Appendix C.

Trends in reading literacy achievement and ethnicity

Table 3.3 presents the mean scores for students in four ethnic groupings. All groups recorded a change in mean achievement over the decade, however, only the difference for the *Other* ethnic grouping was found to be significant (see Table C.4 in Appendix C for *t*-values). While the relativities amongst the ethnic groupings were the same for both years (i.e. Pakeha/European students typically achieved the highest scores while Pasifika students typically achieved the lowest scores), there was no longer a significant difference between the mean scores for Pakeha/European and *Other* ethnic groups. In 1990, Pakeha/European students scored on average 38 scale score points higher than students in the *Other* ethnic grouping with this difference significant; in 2001 the average difference was just two scale score points.

The nature of the difference between Maori and *Other* ethnic group students also changed across the decade. While students in the *Other* ethnic grouping in 1990 achieved scores on average 27 scale score points higher than Maori students this average difference was found not to be significant. In 2001 the difference between the means for the two groups increased to 83 scale score points, and was found to be significant. See Table C.5 in Appendix C for *t*-values.

Table 3.3: Mean reading literacy scores for Year 5 students in each ethnic grouping in 1990 and 2001

Ethnic Groupings	Mean reading score (s.e.)	
	1990	2001
Pakeha/European	523 (4.1)	606 (4.1)
Maori	458 (6.3)	541 (6.3)
Pasifika	433 (13.7)	516 (13.7)
<i>Other</i>	485 (15.4)	568 (15.4)

Note: * The difference between the mean scale scores in 2001 and in 1990 is significant. (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1. Some results may appear inconsistent due to rounding. Missing data for 3% of students in both 1990 and 2001.

Achievement on each reading literacy domain and ethnicity

When examining performances across the three types of text some differences were noted among the ethnic groupings. Pakeha/European students' mean achievement on *documents* was significantly higher in 2001 than in 1990. Similarly, the mean performance of students in the *Other* ethnic grouping on each of *documents* and *expository* texts was significantly higher in 2001 than in 1990. No notable changes in performance on any of the text types were found for Maori or Pasifika students. See Table C.6 in Appendix C for values.

Reading literacy achievement, ethnicity and gender

Girls in the *Other* ethnic grouping were the only group where a significant increase in mean achievement (75 scale score points) was observed over the period 1990 to 2001. Although not of statistical significance, the biggest decrease in mean achievement was recorded for Maori boys, about 20 scale score points.

In 1990, with the exception of the *Other* ethnic grouping, girls in each ethnic group, on average, achieved significantly higher reading scores than their respective male counterparts. Girls in the *Other* ethnic grouping, being the exception, typically achieved (non-significantly) lower scores than their male counterparts. However, in 2001 the marked increase in the achievement of girls in the *Other* ethnic grouping meant that girls in all ethnic groupings achieved higher reading scores, on average, than their male counterparts. However, the large standard errors around the mean scores for Pasifika and *Other* girls and boys, probably explains why the gender differences for these groups were not statistically significant. See Table C.7 in Appendix C for details. The PIRLS-01 study, with its larger sample size and smaller standard errors, concluded that girls regardless of ethnicity typically achieved higher reading scores than boys (see Caygill and Chamberlain, 2004).

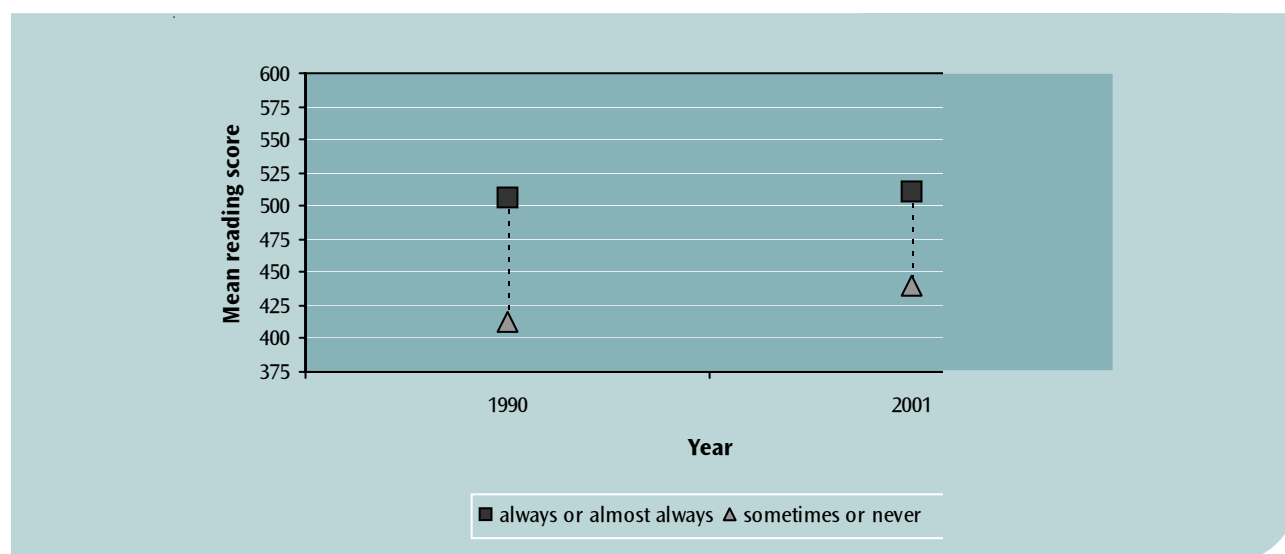
Trends in reading literacy achievement and home language

Students who are familiar with the language of instruction in its spoken form are likely to have less difficulty comprehending what they are reading than those whose knowledge of the spoken language is limited. Results from the 1990-1991 study showed that out of 27 countries New Zealand had the biggest achievement difference between those students who spoke the language of the test at home (in New Zealand's case, English) and those who did not (Elley, 1992).

In 2001, 12 percent of Year 5 students reported that they seldom (*sometimes* or *never*) spoke English at home.¹⁴ This proportion was significantly higher than the eight percent of students who seldom spoke English in 1990. Iceland and the United States also recorded similar increases – four and eight percentage points respectively – in the proportion of students who rarely spoke the language of the test at home (see Table C.8 in Appendix C).

As shown in Figure 3.4, students who often (*always* or *almost always*) spoke English at home achieved on average significantly higher scores than those who seldom spoke it, in both 1990 and 2001. More important was the decrease in the average difference between students in the two 'language' categories, from 96 scale score points in 1990, to 71 scale score points in 2001.

Figure 3.4: Mean reading literacy scores for Year 5 students in 1990 and 2001, by the extent to which they spoke English at home

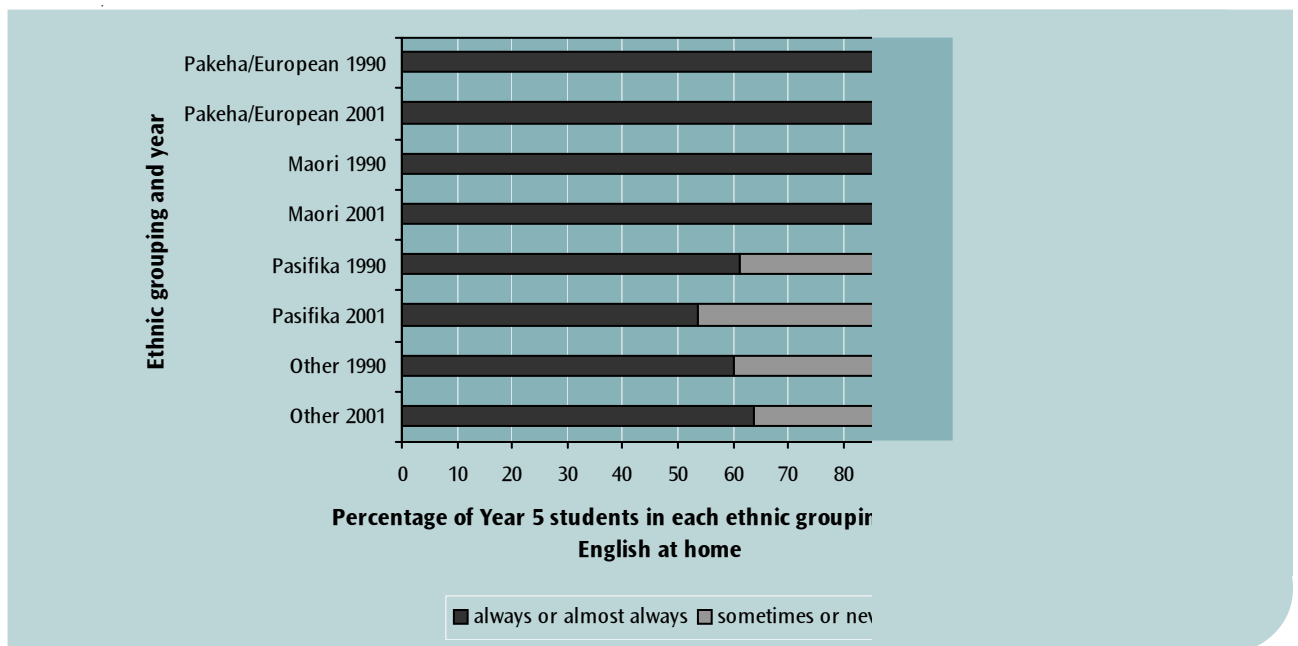


Note: For values, see Table C.9 in Appendix C.

As shown in Figure 3.5, the most marked change over the period was the increase in the proportion of Pasifika students who reported that they rarely spoke English at home (seven percentage points). There was very little change in the proportions of students in each language category for the other groupings, Pakeha/European, Maori, and *Other*. The increase for Pasifika students is consistent with a similar finding in the PIRLS-01 study where 44 percent reported rarely speaking English at home. As mentioned earlier, the *Other* ethnic grouping in the Trends study included Asian students - it is worth noting that more than half of Asian students in PIRLS-01 (56%) rarely spoke English at home.

¹⁴ In PIRLS 2001 students were assessed either in Maori or English, whereas in the 1990 Reading Literacy Study and hence the Trends Study, students were assessed just in English. Students who received instruction in Maori were excluded from the Trends assessment.

Figure 3.5: The extent to which Year 5 students spoke English at home in 1990 and 2001, by ethnic grouping



Note: Adjusted percentages are shown. Missing data for 3% of students in 1990 and 5% in 2001. For values, see Table C.10 in Appendix C.

Trends in reading literacy achievement and school size

In 1990, information on the size of schools was collected from the principals of participating schools by way of questionnaire. This questionnaire was not administered in 2001. However, the Ministry of Education’s school enrolment information used at the time the sampling was undertaken, made it possible to look at trends in performance by size of school.

For the purpose of the following discussion, schools are described as “*large*” if the number of student enrolments total 400 or more, “*medium*” if they were 250 to 399, and “*small*” when student enrolments were less than 250. The proportion of Year 5 students in large schools (400 students or more) increased by 12 percentage points from 20 percent in 1990 to 32 percent in 2001. There was a corresponding decrease, nine percentage points, in the proportion of students in small schools (less than 250 students) from 43 percent in 1990 to 34 percent in 2001. Information on the number of schools by ‘school size’ does not appear specifically in the Ministry of Education’s publication *Education Statistics of New Zealand*, however student enrolment data collected at July 1990 and 2001 by the Ministry show a similar pattern to that illustrated by the Trends study. In particular, the proportion of primary and composite schools in New Zealand with more than 400 students increased over the decade from six percent in 1990 to 12 percent in 2001. Moreover, in 2001 fewer primary and composite schools had enrolments of less than 250 students when compared to 1990, with a decrease from 76 percent in 1990 to 70 percent in 2001.

The mean scores for students in three school-size categories for the two assessments are shown in Table 3.4. It shows that over the decade there was an apparent decrease in the average performance of Year 5 students in small schools, while the average performance of Year 5 students in *larger* schools (≥ 250) increased. However, a closer examination of this information revealed that none of these changes were of statistical significance.

In terms of relative performance in 1990, students in small schools had relatively higher mean achievement than students in medium-sized schools and about the same as students in large schools. A decade later there was no significant difference found between the mean achievement of students in small schools and their peers

in the medium- and large-sized schools. Consistent with this finding, the PIRLS-01 study found that there was no difference in mean achievement across the different school-size bands.

Table 3.4: Mean reading literacy scores for Year 5 students in 1990 and 2001, by school size

Size of school	1990		Percentage of students
	Percentage of students	Mean reading score (s.e.)	
small (less than 250)	43	509 (5.0)	34
medium (250 to 399)	37	481 (8.4)	34
large (400 or more)	20	508 (11.5)	32

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.

Trends in reading literacy achievement and school location

Principals of the participating schools in 1990 also provided information on the urban or rural locality of their schools. As was the case in the previous section, Ministry of Education school profile information is used to look at trends in achievement by the location of schools students attended.

The change leading to greater proportions of students attending large schools has been at least partially due to the amalgamation of smaller schools, particularly in urban areas. In the Trends study in 2001, schools with less than 100 students were all located in **rural** areas, whereas in 1990, some of the schools of this size were in urban areas (9% of students in schools of size less than 100 were in urban schools; 91% in rural schools). As shown in Table 3.5, however, the proportion of students in rural and urban schools remained static over the decade.

Table 3.5: Mean reading literacy scores for Year 5 students in 1990 and 2001, by school location

School location	1990	
	Percentage of students	Mean reading score (s.e.)
rural	19	518 (9.0)
urban	81	494 (4.8)

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.

In 1990, New Zealand rural students achieved, on average, significantly higher scores than their urban counterparts (a difference of 25 scale score points). According to Elley (1994), this difference favouring the rural students was the largest observed among the 27 countries in the 1990-1991 study. Over the decade, there was a significant decrease (34 scale score points) in the mean score for rural students and a small non-significant increase (13 scale score points) in the mean for urban students. That is, in 2001 students in urban schools had higher mean achievement than their rural counterparts (a difference of 23 scale score points), although the difference was not statistically significant.

In order to understand why the reading achievement of rural students had decreased over the decade, rural students' reports on activities such as reading for fun, the amount of television viewing they did, and their level of book borrowing, were examined for 1990 and 2001. No discernible differences were found between 1990 and 2001. That is, similar proportions of rural students in 2001 were reading for fun daily, watching moderate amounts of television, and borrowing books regularly as their counterparts in 1990. The number of books reported to be in the homes of rural students in 1990 and 2001 were also compared. Again, there were no notable differences. The activities that students engage in during their leisure time can potentially result in learning or reinforce learning that happens in the classroom. However, watching television may not be educationally advantageous with respect to reading. This section describes students' voluntary reading activities as well as time spent watching television.

Trends in out-of-school activities

Voluntary reading activities

Voluntary reading activities give students the opportunity to practise and maintain their reading skills with reading materials and for a purpose chosen by them. Where reading activities are undertaken regularly, rather than spasmodically, reading ability might be expected to improve.

Year 5 students were asked whether they had read a book for fun, a comic, a magazine, or a newspaper in the week prior to the assessment. The proportion of students reporting that they had read a book for fun increased by seven percentage points from 1990 to 2001 (66% cf. 73%), while about the same proportions of Year 5 students had read a magazine (31% in 1990 and 32% in 2001). Proportionately fewer students reported reading a comic or a newspaper in 2001 (20% and 40% respectively) compared with their peers in 1990 (28% and 49% respectively). For details, see Table C.11 in Appendix C.

In addition to answering questions about the types of texts they read in the week prior to the assessment, students were also asked to indicate whether they read these text items *daily*, *weekly*, *monthly*, or *never*. Table 3.6 presents a summary of the information. According to their reports, students were reading magazines and books for fun as frequently in 2001 as they were in 1990, but were less likely to read comics and newspapers on a daily basis. The decrease in the proportion of students reading a newspaper is consistent with the decrease in the proportion of students whose homes received a daily newspaper as shown in Figure 4.2 in the next chapter.

Table 3.6: Voluntary reading activities undertaken by Year 5 students in 2001

Reading material	Read monthly or less often		Read weekly or more often	
	Percentage of students in 2001	1990 to 2001 difference (s.e.)	Percentage of students in 2001	1990 to 2001 difference (s.e.)
book	27	0 (2.1)	29	0 (2.1)
comic	81	4 (1.7) ▲	12	11 (1.7) ▼
magazine	74	0 (2.2)	17	0 (2.2)
newspaper	63	5 (2.8)	25	10 (2.8)

Key: ▲ The percentage for 2001 is significantly higher than the percentage for 1990.
▼ The percentage for 2001 is significantly lower than the percentage for 1990.

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1. Adjusted percentages are shown. Missing data for up to 4% of students.

Source: Martin, Mullis, Gonzalez, & Kennedy (2003).

Internationally and in New Zealand reading books for fun regularly was positively associated with achievement, with those students who read books for fun daily typically having higher reading achievement than those who did not (Martin, Mullis, Gonzalez & Kennedy, 2003). Figure 3.6 illustrates this relationship. A positive association between achievement and the frequency of reading magazines, newspapers and comics was not observed in this study.

There was no significant change over the decade in the proportions of girls and boys who reported reading books for fun on a daily basis (girls 47% in 1990 and 50% in 2001; boys 36% in 1990 and 38% in 2001). Furthermore, the differential between the proportions in favour of girls was about the same in 2001 as in 1990 – 11 percentage points difference in 1990 and 12 percentage points difference in 2001.

Figure 3.6: Mean reading literacy scores for Year 5 students in 1990 and 2001, by the frequency of reading books for fun



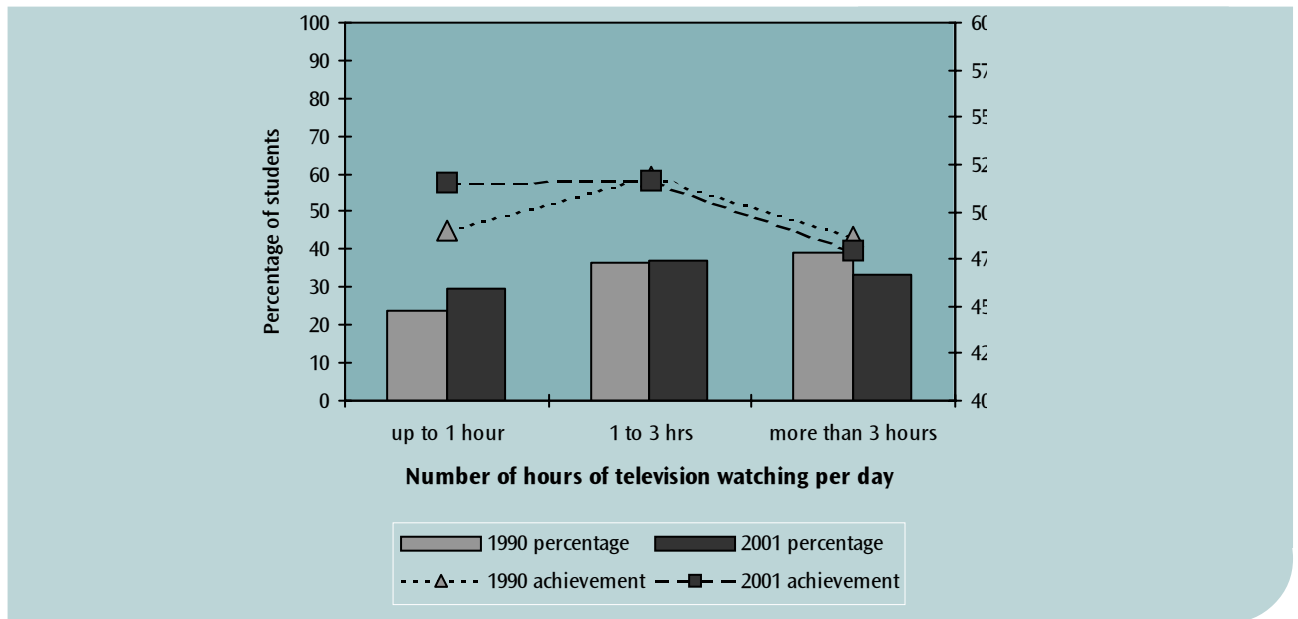
Note: Missing data for 2% of students in 1990 and 3% in 2001.
For values, see Table C.12 in Appendix C.

Television watching

The 1990-1991 study showed that most students spent some of their time after school watching television with higher achieving students tending to spend less time watching television than other students. Finland, the highest performing country in the 1990-1991 Reading Literacy Study, was an exception, with higher performing children reporting higher levels of television watching. In 1990-1991, Finnish television broadcast foreign-language programmes with Finnish-language subtitles. In contrast with the possible benefits to reading ability of television watching in Finland, for most New Zealand students there was likely to be little reading involved in watching television.

Year 5 students were asked about the number of hours that they usually spent watching television or video outside of school hours on a school day. New Zealand, along with five other Trends study countries, recorded significant decreases in the proportions of students watching television for more than three hours a day. This decrease in heavy viewing was reflected in the corresponding increase in the proportion of students reporting that they watched very little television (up to one hour - see Martin, Mullis, Gonzalez & Kennedy, 2003 for details). Figure 3.7 presents the proportions of New Zealand students in each viewing category for 1990 and 2001, along with the mean scores for students in each of the viewing categories. Generally, those students who watched more than three hours of television or video a day had lower achievement than those who reported lighter viewing.

Figure 3.7: Year 5 students' reports of time spent watching television or videos in 1990 and 2001



Note: Adjusted percentages are shown. Missing data for 3% of students in both 1990 and 2001. For values, see Table C.13 in Appendix C.

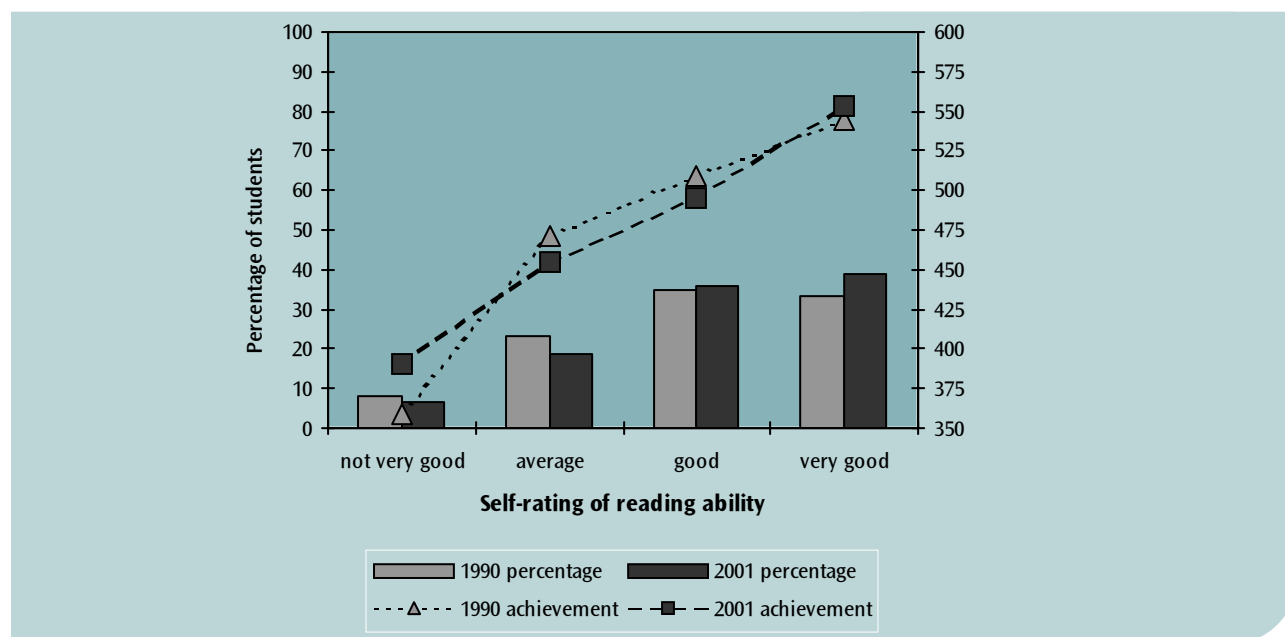
Students' attitudes to reading

Students' attitudes to reading shape their behaviours towards reading. Students who believe in their own abilities and enjoy reading are more likely to engage in reading activities voluntarily than other students. This section explores trends in students' self-rating of reading ability and their beliefs in what it takes to become a good reader.

Students' self-rating of reading ability

Students were asked how they would rate their own reading ability: *very good*, *good*, *average*, or *not very good*. The proportion of students who rated themselves as very good increased over the eleven-year period from 33 percent in 1990 to 39 percent in 2001. In 2001 there were seven percent of students who indicated that they were not very good at reading, a similar proportion to that found in 1990 (8%). As shown in Figure 3.8, self-rating at reading was positively associated with performance in reading in both 1990 and 2001. That is, students who thought that they were good at reading typically had higher mean reading scores than those students who were less positive about their reading abilities.

Figure 3.8: Year 5 students' self-rating of their reading ability in 1990 and 2001



Note: Adjusted percentages are shown. Missing data for 2% of students in 1990 and 3% in 2001. For values, see Table C.14 in Appendix C.

Students' views on the best ways to become a good reader

Students were asked to select, from a list of 11 options, the three most important ways to become a good reader. The listed items, in this order, were:

- Liking it;
- Having lots of time to read;
- Being able to concentrate well;
- Knowing how to sound out words;
- Learning the meaning of lots of words;
- Having many good books around;
- Having a lively imagination;
- Having lots of reading for homework;
- Having lots of drill (practice) at hard things;
- Having lots of written exercises; and
- Being told how to do it.

Table 3.7 summarises the level of agreement on each option for the two studies. Essentially, student views on ways to become a good reader have changed very little since 1990. The two ways most often identified in both 1990 and 2001 were *having lots of time to read* and *liking it*. In 1990, *being able to concentrate well* (36% of students) and *knowing how to sound out words* (34%) were also popular options. Interestingly, proportionately more Year 5 students (6 percentage points) in 2001 selected *knowing how to sound out words* compared to their 1990 peers. The other change worthy of note was on the option *having a lively imagination*, where proportionately more students in 2001 selected this as one of the three most important ways to become a good reader (an increase of 6 percentage points).

Table 3.7: Year 5 students' views on ways to become a good reader in 1990 and 2001

Ways to become a good reader	Per
	1990
having lots of time to read	49 (1.3)
liking it	39 (1.3)
being able to concentrate well	36 (1.3)
knowing how to sound out words	34 (1.3)
learning the meaning of lots of words	32 (1.0)
having many good books around	29 (1.0)
having lots of reading for homework	21 (0.9)
having a lively imagination	19 (0.9)
having lots of drill (practice) at hard things	12 (0.9)
being told how to do it	8 (0.8)
having lots of written exercises	7 (0.6)

Key: ▲ The percentage for 2001 is significantly higher than the percentage for 1990.
▼ The percentage for 2001 is significantly lower than the percentage for 1990.

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.
Adjusted percentages are shown. Missing data for 2% of students in 1990 and 4% in 2001.

4

Trends in the Home Context for Reading Achievement

This chapter presents information about the home context of students with a particular focus on resources and activities that would promote reading as a leisure activity and augment activities done in the classroom.

Key points

- Year 5 students in 2001 were likely to be in households with a greater number of household possessions than their 1990 counterparts were. There was no change in the positive relationship between the number of household possessions and students' reading achievement.
- Year 5 students in 2001 were more likely to live in households with a computer and a place to study, and have a moderate number of books than their 1990 counterparts. The positive relationship between reading achievement and the educational resources, a computer and books at home, was observed in both assessments.
- A decrease in Year 5 students' reports of borrowing books on a weekly basis over the decade was accompanied by an increase in monthly borrowing. However, the positive relationship between borrowing books and reading achievement remained unchanged.
- Proportionately more Year 5 students reported that they read aloud regularly in 2001 than students did in 1990.

Home and student possessions

In the 1990-1991 Reading Literacy Study, a surrogate measure of students' socio-economic background was obtained using home and student possession scales. Students were asked which items, from a list of 10, could be found in their homes, and which items, from a list of eight, they themselves owned.

The 10 home possessions were: *television*,¹⁵ *washing machine*, *stereo*, *video*, *clothes dryer*, *computer*, *dishwasher*, *microwave*, *a second bathroom*, and *a second car*. Although ownership of some of the items may reflect lifestyle choices, households with many or all of the items would be likely to have a higher disposable income than households with a smaller number of items.¹⁶

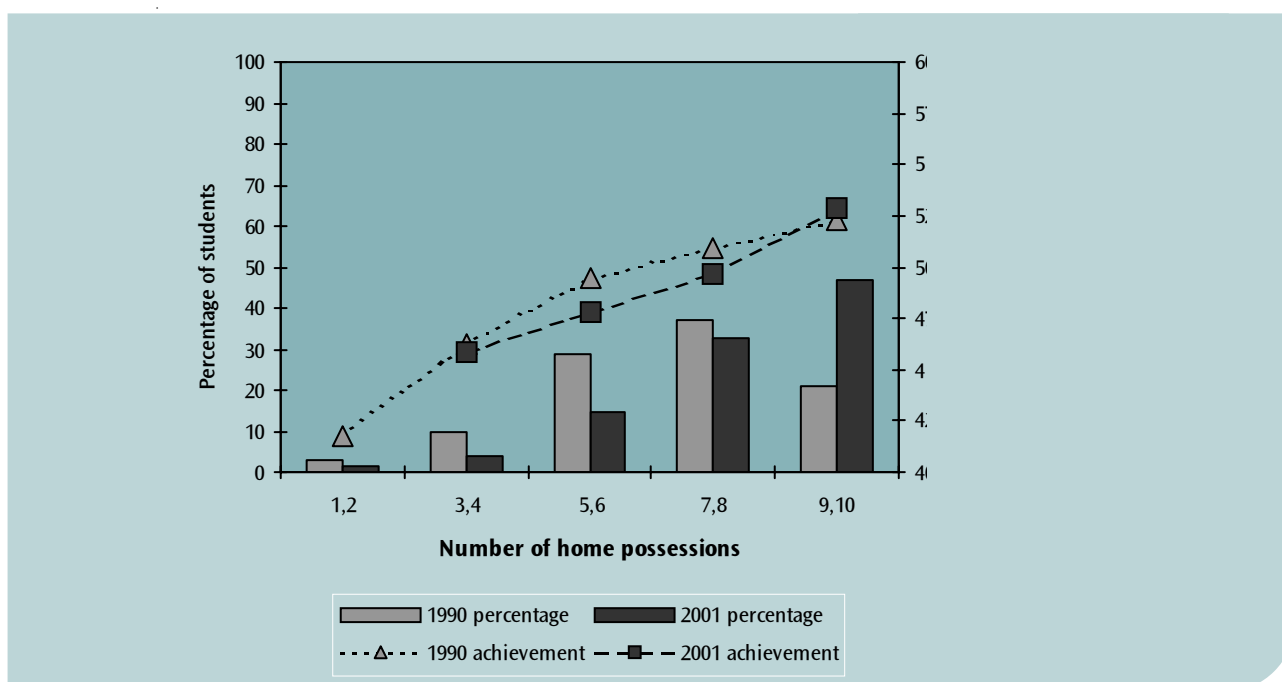
¹⁵ In the questionnaire television was listed as TV.

¹⁶ For purposes of measuring trends, the 10 home possessions used in 1990 were used again in 2001. A range of items were selected for this question in 1990 knowing that at least some (*television* and *washing machine*) were likely to be in the homes of nearly all students and therefore would not provide an indicator of household wealth, while others such as *dishwasher* and *second bathroom* were more likely to be found in homes with greater disposable income and therefore would prove to be a better indicator of socio-economic status.

Based on their responses, Year 5 students in 2001 were likely to be in homes with more of the aforementioned items than their counterparts were in 1990 as shown in Figure 4.1. Fifty-eight percent of students in 1990 reported that at least seven of the 10 items were in their home. By 2001, the proportion of students with at least seven items in their home had increased to 80 percent. There was a corresponding decrease in the proportion of students with less than five items in their home – 13 percent in 1990 to 5 percent in 2001. It is interesting to note that the item showing the largest increase (37 percentage points) over the decade was the computer, with 80 percent of students reporting they had a computer in 2001 compared with 43 percent in 1990. For further information on the individual items see Table D.1 in Appendix D.

Figure 4.1 illustrates the positive relationship between reading achievement and the number of home possessions in both 1990 and 2001. That is, the more items reported to be in the homes of Year 5 students, the higher their reading achievement.

Figure 4.1: Number of items reported to be found in the homes of Year 5 students in 1990 and 2001



Note: The home possessions were: television, washing machine, stereo, video, clothes dryer, computer, dishwasher, microwave, a second bathroom, & a second car.

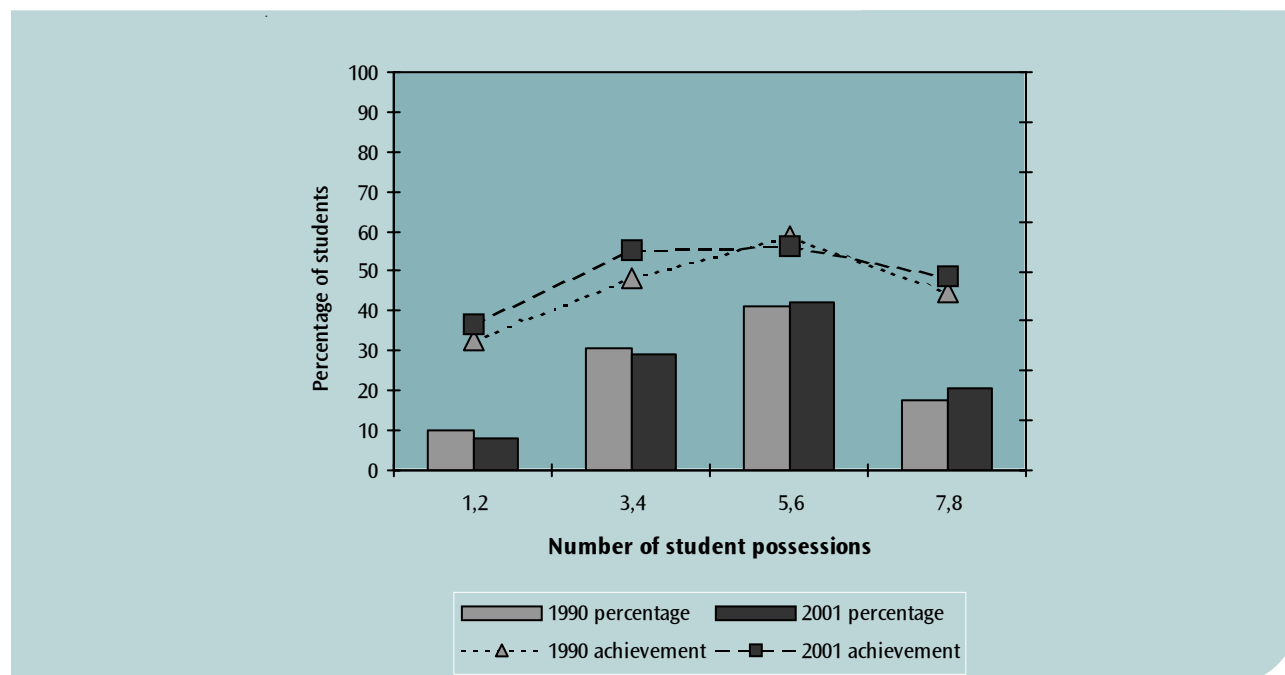
There were too few students with only 1 or 2 home possessions in 2001 to report their achievement.

Adjusted percentages are shown. Missing data for 3% of students in 1990 and 4% in 2001.

See Table D.2 in Appendix D for values.

Students were also asked if they had their own: *reading books, bicycle, bedroom, radio, camera, television, walkman, and a place to study*. The proportions of students with their own items had changed little over this eleven-year period. See Figure 4.2. The relationship between reading achievement and the number of student possessions was, however, not as strong as the relationship with the number of home possessions. In both assessments students with few of their own possessions (1 or 2) tended to have significantly lower mean achievement than those with a more moderate number (3 to 6) of possessions. Interestingly, students with all or nearly all of the student possessions (7 or 8) had relatively lower mean achievement than their peers with a more moderate number of items (although not all of the differences were significant).

Figure 4.2: Number of possessions Year 5 students had in 1990 and 2001



Note: The student possessions were: reading books, bicycle, bedroom, radio, camera, television, walkman, and a place to study. Adjusted percentages are shown. Missing data for 3% of students in 1990 and 4% in 2001. See Table D.3 in Appendix D for values.

Educational resources at home

While the presence of educational resources in the home may reflect the relative wealth of the home, it may also indicate how education is ‘valued’. This section presents students’ reports on the number of books that could be found in their homes, and whether or not they had their own books. In addition, other educational resources, namely the presence of a computer in the students’ homes, a place for students to study at home, and whether or not their households were in receipt of a daily newspaper, are examined.

Books in the home

One of the findings from the 1990-1991 study was the positive association between the number of books in the homes of students and their reading achievement. That is, students who reported that their homes had a relatively large number of books typically had higher reading achievement than students who reported having relatively few books. Furthermore, New Zealand was among the countries where this relationship was strongest (Elley, 1994).

Table 4.1 presents the Year 5 students’ estimates of the number of books in their homes. For the most, there was very little difference in the proportions in each year. The one notable exception was a significant decrease of seven percentage points in the proportion of Year 5 students who reported having more than 200 books in their home; 39 percent in 1990 to 32 percent in 2001. This decrease appears to have occurred mostly in the homes of Pakeha/European students (47 percent in 1990 compared with 38 percent in 2001).

Internationally, six out of the nine Trends study countries recorded significant decreases in the proportions of students reporting to have more than 100 books in their homes. The biggest decrease was in the United States (11 percentage points), followed by Iceland (8 percentage points), Sweden (7 percentage points), Hungary (6 percentage points), and Italy and Slovenia (both 5 percentage points). Greece and Singapore were the two countries to have a significant increase (7 percentage points and 6 percentage points respectively), while New Zealand reported no change in this category.

Table 4.1: Year 5 students' reports of the number of books in the home in 1990 and 2001

Number of books in the home	Perce
	1990
0	2
1-10	7
11-50	13
51-100	20
101-200	20
more than 200	39

Key: ▼ The percentage for 2001 is significantly lower than the percentage for 1990.

Note: Some results may appear inconsistent due to rounding.

The positive relationship between achievement and the number of books in the home evident in 1990-1991 was still evident in 2001 (see Table D.4 in Appendix D for values). Note that in most countries, in both 1990-1991 and 2001, the two categories *101-200 books* and *more than 200 books* did not discriminate in terms of reading achievement and for reporting purposes were collapsed into one category. For all countries in the Trends study, both in 1990-1991 and 2001, students with few books in the home (10 or fewer) had lower mean achievement than those with more than 10. For seven of the nine countries, including New Zealand, students with more than 100 books had higher average reading achievement than their counterparts with fewer books, both in 1990-1991 and 2001. The exceptions were Greece and Italy, where Greek and Italian students reporting that 51 to 100 books were in their home had similar achievement to those with more than 100.

Other educational resources

Figure 4.3 illustrates two notable changes that occurred over the decade, in terms of the presence of educational resources in the home: an increase in the presence of computers in students' homes and a decrease in the number of homes that received a daily newspaper.

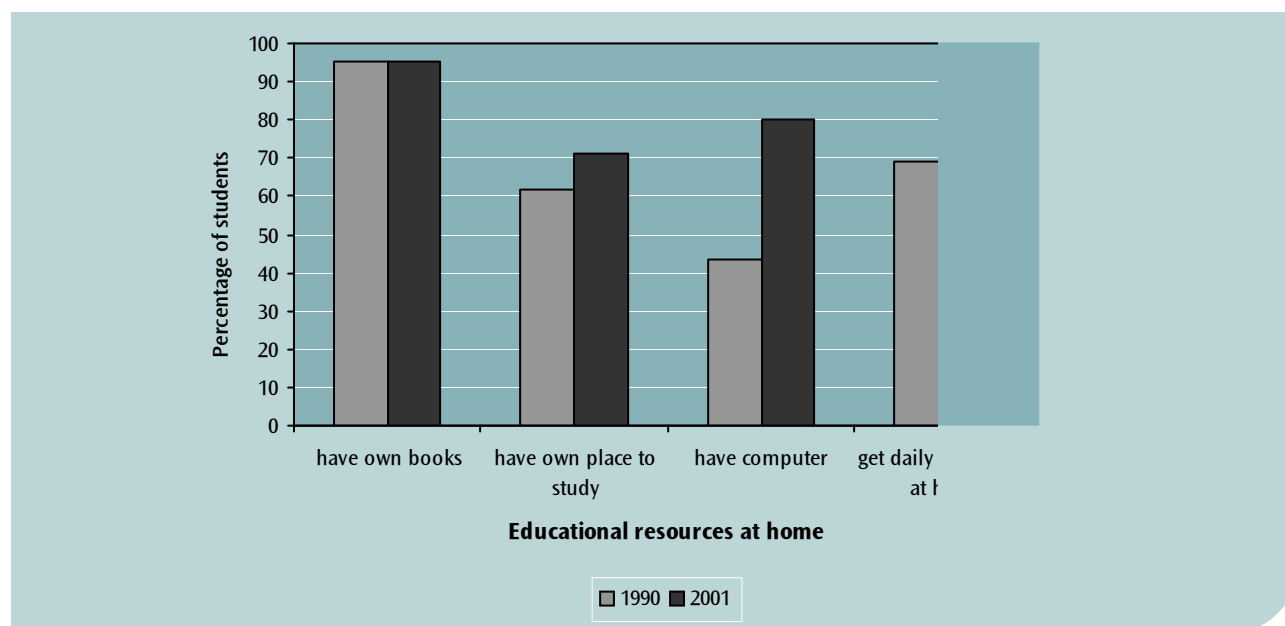
Year 5 students were more likely to be in a home with a computer (80% compared with 43%) and have their own place to study (71% and 62%) in 2001 than in 1990. They were equally likely to have their own reading books (95%), and were less likely to be in homes that received a daily newspaper, a significant decrease from 69 percent in 1990 to 59 percent in 2001. The change in the practice of households receiving a daily newspaper was also observed in almost all Trends study countries; Slovenia (no change) and Hungary (significant increase) were the exceptions.

The increases in computer ownership and a place to study were observed across all ethnic groupings, while the decrease in receipt of a daily newspaper was mainly limited to the households of Pakeha/European students (see Table D.6 in Appendix D).¹⁷ However, there was no change in the difference in computer ownership amongst the ethnic groupings over the decade. Proportionately fewer Maori (36% in 1990, 70% in 2001) and Pasifika (29% in 1990, 65% in 2001) students were in homes with a computer compared with their Pakeha/European (47% in 1990, 84% in 2001) and *Other* (44% in 1990, 92% in 2001) counterparts.

In terms of achievement, students with their own books generally achieved higher than the relatively small proportion (5%) of students who did not have their own books. In 1990 the difference between mean scores for the two groups was 71 scale score points, and in 2001 this had increased to 90 scale score points. Similarly, students in households with a computer generally had higher mean scores than those in households without a computer (differences of 25 and 56 scale score points in 1990 and 2001 respectively).

¹⁷ This decrease for Pakeha/European students was significant. A decrease in households receiving a daily newspaper was also observed for *Other* ethnic grouping students but this decrease was not statistically significant.

Figure 4.3: Educational resources in the homes of Year 5 students in 1990 and 2001



Note: Adjusted percentages are shown. Missing data for up to 8% of students. See Table D.5 in Appendix D for values.

In 1990 students in households that received a daily newspaper typically had higher achievement than those in households that did not (23 scale score points difference), while students with their own place to study generally had higher achievement than those without a place to study (22 scale score points difference). However, in 2001 this pattern had almost reversed with students in households that received a daily newspaper typically having lower achievement than those that did not (16 scale score points difference). There was no significant difference in mean achievement between students with their own place to study and those without in 2001. For values, see Table D.7 in Appendix D.

Book borrowing

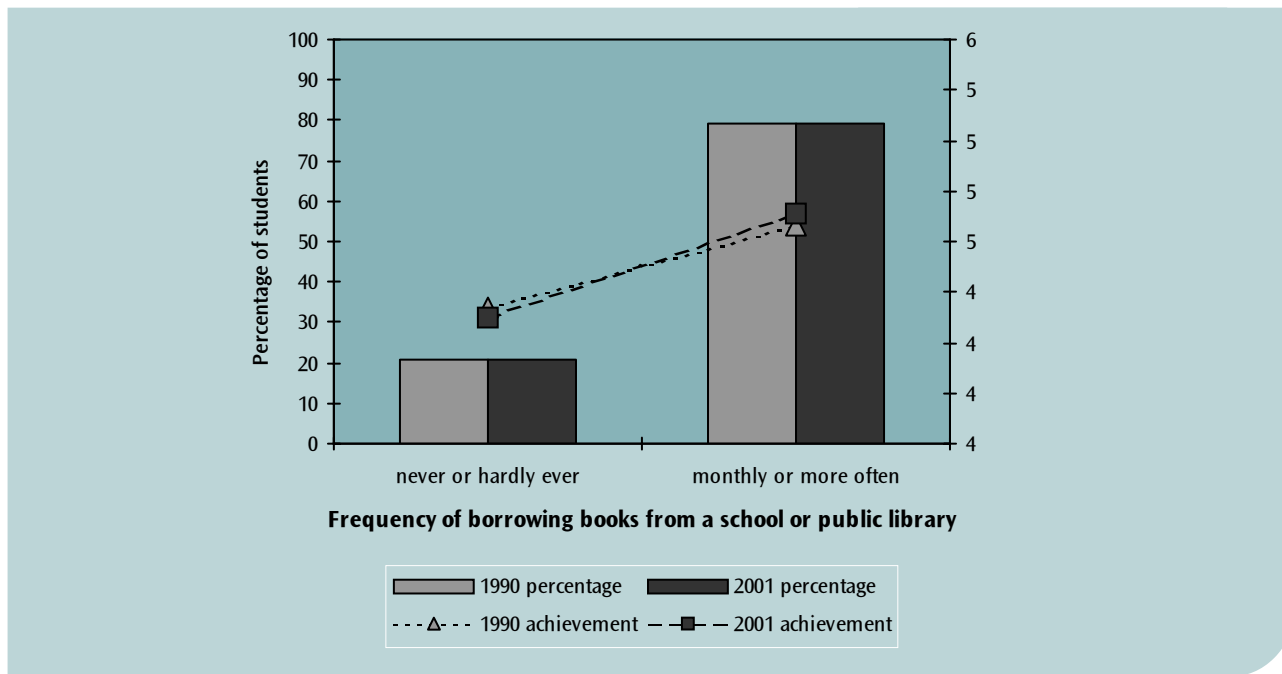
While the presence of educational resources in the home may reflect whether money is available to purchase them, the activity of borrowing books from the school or public library is more likely to be independent of wealth. This section examines trends in book borrowing from a school or public library.

Figure 4.4 presents the proportions and mean reading scores for Year 5 students according to their reports of borrowing books. Over the 11-year period there was a small decrease in the proportion of Year 5 students borrowing books on a weekly basis but this was offset by an increase in monthly borrowing. The proportion of Year 5 students reporting that they borrowed books at least *weekly* decreased slightly from 65 percent in 1990 to 61 percent in 2001, while the proportion of students borrowing monthly increased from 14 percent to 18 percent. There was no change in the proportion of students who reported that they *never or hardly ever* borrowed books from a school or public library (21% in both years).

In most of the other the Trends study countries, the book borrowing habits observed in 2001 were somewhat different to those observed in 1990-1991. Interestingly, all countries recorded either a decrease or no change in the proportion of students borrowing at least weekly. Some of the weekly decreases were accompanied by increases in monthly borrowing – for example – Hungary and Slovenia, while in Sweden and Singapore there was an increase in students rarely borrowing books. Iceland and Greece were the only two countries to report significant decreases in the proportions rarely borrowing books accompanied by increases in monthly book

borrowing in 2001. Essentially there was no change in the incidence of borrowing library books in either Italy or the United States.

Figure 4.4: Year 5 students' reports of book borrowing from a school or public library in 1990 and 2001



Note: See Table D.8 in Appendix D for values.

The question on book borrowing did not ask about the **number** of books students borrowed. That is, a student who borrowed one book each week would have similar opportunities to read as a student who borrowed four books each month. In this regard, borrowing on a **regular basis** regardless of frequency merits examination with regards to achievement.

According to findings from the 1990-1991 study, students across the 27 countries who borrowed books more often tended to have higher performance than those students who borrowed less frequently (Elley, 1992). When Elley examined factors that differentiated high-scoring countries and low-scoring countries, he found that students in high-scoring countries had a mean borrowing score of 3.27 (between *once a week* and *once a month*) while students in low-scoring countries averaged only 2.84 (between *once a month* and *hardly ever*). In 2001, students in eight out of the nine countries, who borrowed books regularly (monthly or more often) tended to have higher achievement than those who hardly ever or never borrowed books. Greece was the exception – there was no significant difference in achievement between those students who borrowed books regularly and those who did not. It was not possible to detect from other questions why Greek students followed a different pattern with regards to achievement and book borrowing habits. For example, Greek students did not have more books at home, nor did they report more reading homework than students in other countries. Moreover, Greece was the country to show the largest increase in achievement between 1991 and 2001. It would be interesting to investigate classroom practice in Greece.

Reading aloud at home

Reading aloud is an activity that children frequently engage in when learning to read. By Year 5 it might be expected that competent readers would be less likely to read aloud to someone and more likely to read silently on their own, while students who read aloud do so because they are experiencing difficulties with reading. Students were asked “*How often do you read in English to someone at home?*”. There was no change between 1990 and 2001 in the proportions of students reporting that they read in English to someone at home. However, there was a change in the frequency of doing this activity. Proportionately more students in 2001 responded that they read aloud *three or more times a week* (47%) when compared with 1990 (41%). Students who read aloud *three or more times a week* achieved significantly lower scores, on average, than students who undertook this activity relatively infrequently (see Table D.9 in Appendix D for details). A further examination of the two student groups (i.e. those who read aloud regularly and those who did not) did not provide any information that explained why the former group had grown over the decade.

Students were also asked about the frequency of being read to by someone at home in English, the frequency of being read to in another language, and the frequency of being asked questions about what they were reading. Proportionately more students in 2001 than in 1990 responded that they were involved regularly in these sorts of reading interactions at home (see Table 4.2). Not surprisingly, students who reported that someone regularly read to them in a language other than English were also more likely to have reported that they rarely spoke English at home.

Table 4.2: Reading activities undertaken by Year 5 students at home in 1990 and 2001

Reading activities in the home	Frequency		
	Never		
	1990	2001	
student reads in English to someone at home	23	21	
someone at home asks about student's reading	36	28 ▼	
someone at home reads to student in English	36	30 ▼	
someone at home reads to student in another language	83	76 ▼	

Key: ▲ The percentage for 2001 is significantly higher than the percentage for 1990.
▼ The percentage for 2001 is significantly lower than the percentage for 1990.

Note: Some results may appear inconsistent due to rounding.
Adjusted percentages are shown. Missing data for up to 4% of students.

5

Trends in Classroom Reading Activities

This chapter presents students' perceptions of the classroom activities in which they engaged, with a particular focus on reading activities. This chapter does not contain any information from students' teachers, as they were not required to be involved in the 2001 study.

Key points

- Reading story books in class was less likely to be undertaken by Year 5 students as a daily activity in 2001 than in 1990.
- Year 5 students were more likely to be assigned written work about their reading on a regular basis in 2001 than in 1990.
- Students' perceptions of the amount of reading homework they received and their expectations of what they would do for reading homework, had changed little over the 11-year period from 1990 to 2001.

Reading activities in class

In 1990-1991, proportionately fewer New Zealand students read textbooks in class on a daily basis compared with their peers in 26 other countries, 17 percentage points fewer than the international mean (Caygill, 1993). They were also less likely to use workbooks during reading lessons on a daily basis (6 percentage points fewer than the international mean). However, New Zealand students were more likely than their international counterparts to read story books daily (21 percentage points more than the international mean) and look up information in reference books daily (8 percentage points more than the international mean). A decade later students were again asked for details of the frequency with which they read textbooks and story books as well as the frequency with which they used workbooks or practice exercises during their reading or language lessons.

In 2001, proportionately fewer Year 5 students reported reading textbooks and story books in class on a daily basis (6 and 9 percentage points fewer respectively) than students in 1990. There was little change in the frequency of use of workbooks and practice exercises. Table 5.1 presents a summary of the information for both assessments.

There was no significant relationship between Year 5 students' achievement and the frequency with which these reading activities were undertaken in class.

Table 5.1: Reading activities undertaken by Year 5 students during reading or language lessons in 1990 and 2001

Reading activity	Percentage		
	Monthly or less often ^a		
	1990	2001	
read textbooks	47 (2.4)	48 (3.3)	1
read story books	28 (1.9)	34 (3.0)	2
use workbooks or practice exercises	40 (2.4)	33 (2.8)	2

Key: ▲ The percentage for 2001 is significantly higher than the percentage for 1990.
▼ The percentage for 2001 is significantly lower than the percentage for 1990.

Note: ^aMonthly or less often includes the students who selected almost never and the students who selected about once a month. Some results may appear inconsistent due to rounding. Adjusted percentages are shown. Missing data for up to 4% of students.

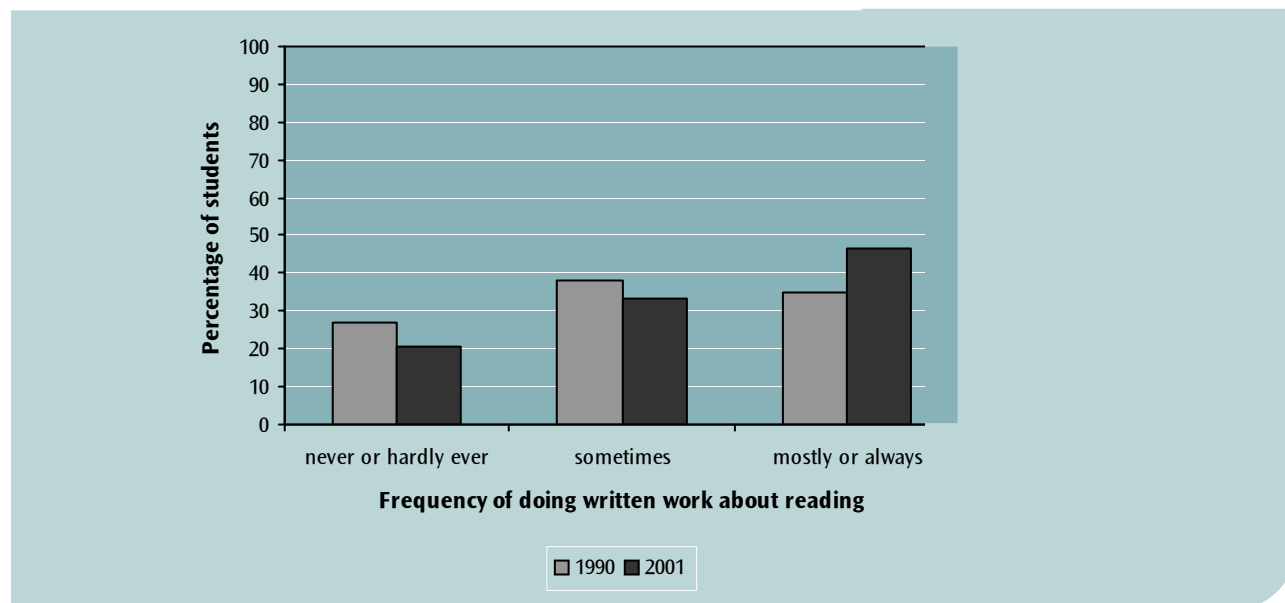
In line with the findings for New Zealand, proportionately fewer students in five out of the other eight countries, reported reading textbooks in class on a daily basis in 2001 than in 1990-1991: Iceland (14 percentage points fewer), Singapore (16), Slovenia (11), United States (11), and Sweden (8) (Martin, Mullis, Gonzalez, & Kennedy, 2003). Similar to New Zealand students, Singaporean students (11 percentage points fewer) and to a lesser extent Hungarian students (5 percentage points fewer), were also less likely to read story books on a daily basis than previously. Furthermore, there was a corresponding increase in the proportion of Singaporean students reporting that they rarely read story books (10 percentage points more), along with Swedish (5) and Slovenian students (7). Students in Greece, Iceland, and the United States reported very little change in the frequency of story book reading in class.

Written work about reading

Students were asked how often their teacher assigned written work related to their reading. As shown in Figure 5.1, proportionately more Year 5 students in 2001 reported that their teachers regularly (*mostly or always*) assigned written work compared with their counterparts in 1990 (12 percentage points difference). Analogous to this, was a decrease in the proportion of students reporting that they were rarely (*never or hardly ever*) given written work to do (7 percentage points fewer).

In both 1990 and 2001 students who reported that they rarely wrote about what they had been reading generally had higher mean achievement than those students who reportedly did this more frequently. This finding was consistent with findings from PIRLS-01 where students who reported doing written work after reading typically had lower achievement than students who did this type of activity less frequently (Mullis et al., 2003). It seems likely that this type of activity was undertaken at the Year 5 level for remedial purposes.

Figure 5.1: Year 5 students' reports of doing written work about reading in 1990 and 2001



Note: For values, see Table E.1 in Appendix E.

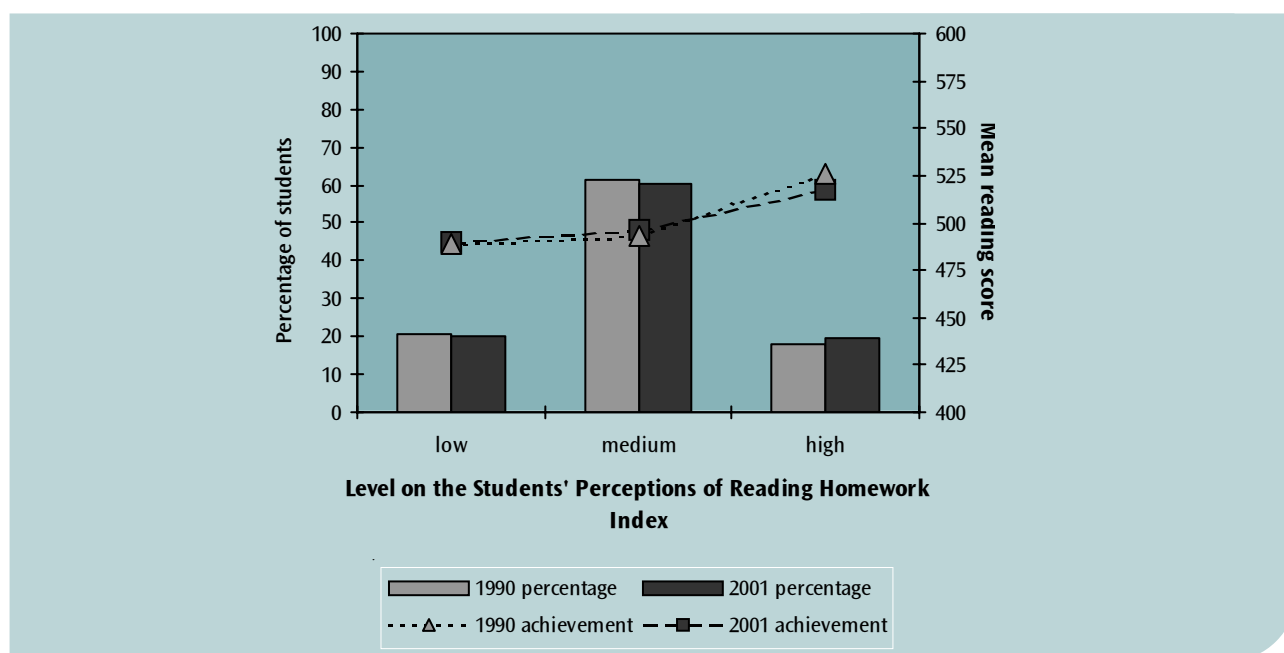
Homework

Students were asked about the frequency with which they were given homework and how much time they spent on assigned homework. The responses to the two questions were combined into an index – Students' Perceptions of Reading Homework (SPRH) Index – to provide an indication of the level of homework undertaken by students. Students were assigned to the high level of the index if they reported that they spent more than half an hour at least three times a week on reading homework. Students were assigned to the low level of the index if they reported they received reading homework twice a week or less often and spent less than quarter of hour doing it. Students with other combinations were assigned to the medium level of the index.

Figure 5.2 presents the proportions of students at each level of the index and the corresponding mean scores for 1990 and 2001. There was virtually no change in the proportions of Year 5 students at each level of the SPRH Index over the period. Furthermore, the figure also illustrates a positive relationship between homework and reading achievement. That is, students assigned a regular amount of homework and which required the student to spend a *reasonable* amount of time to complete (i.e. at the high level) typically achieved higher reading scores than students who were given reading homework relatively infrequently and on which students spent very little time to complete (i.e. at low level). Note that while significant differences were found among the levels of the index in 1990, no significant differences were detected for 2001. This is probably due to the relatively small sample of students at each level of the index as reflected in the relatively large standard errors.

Internationally, proportionately fewer Greek, Hungarian, Singaporean, Italian, and to a lesser extent Slovenian students, were assigned and doing high levels of homework in 2001 than in 1990-1991 (respectively 10, 6, 11, 6, and 5 percentage points fewer students at the high level of the index). By way of contrast, modest increases in homework levels were reported for Sweden, Iceland, and the United States (i.e. 4, 5, and 14 percentage points fewer respectively at the low level of the index).

Figure 5.2: Students' Perceptions of Reading Homework (SPHR) Index in 1990 and 2001



Note: A high level on the index indicates that students reported that they spent more than half an hour at least three times a week on reading homework; the low level of the index indicates they reported that they received reading homework twice a week or less often and spent less than a quarter of an hour doing it. Adjusted percentages are shown. Missing data or responses inconsistent for up to 28% of students. For values, see Table E.2 in Appendix E.

In terms of achievement however, the patterns differed across countries. Whereas for New Zealand and Iceland the pattern showed a positive relationship between the amount homework and achievement, for other countries this was not the case. For example, in Slovenia and the United States higher achievement was associated with students at the low level of the index. The achievement patterns observed in each country however held across the two assessments.

Students were also asked how often they were questioned in class about their reading homework, how often they were helped with reading homework, and how often they were expected to complete any unfinished reading work in their own time. For details see Tables 5.2, 5.3, and 5.4. Essentially there was very little change over the 11-year period in the incidence of Year 5 students undertaking these activities.

Table 5.2: Year 5 students' reports of the level of questioning about reading homework in class in 1990 and 2001

Year	Percentage of Year 5 students		
	Don't get homework	Never	Hardly ever
1990	1	12	27
2001	1	12	27

Note: Some results may appear inconsistent due to rounding. Adjusted percentages are shown. Missing data or responses inconsistent for up to 25% of students.

Table 5.3: Year 5 students' reports of assistance with their reading homework in 1990 and 2001

Year	Percentage of Year 5 students v	
	Don't get homework	Hardly ever
1990	2	40
2001	3	41

Note: Some results may appear inconsistent due to rounding.
Adjusted percentages are shown. Missing data or responses inconsistent for up to 25% of students.

Table 5.4: Year 5 students' reports on expectations to complete unfinished reading work in own time in 1990 and 2001

Year	Percentage of Year 5 students expected to cc		
	Don't get that type of reading work	Never	Hardly ever
1990	8	10	11
2001	7	12	14

Note: Some results may appear inconsistent due to rounding.
Adjusted percentages are shown. Missing data for up to 3% of students.

Summary

This report has presented findings from the partial replication of the 1990-1991 study on the reading literacy of middle primary students conducted by the IEA. Nine countries participated in the Trends study, which was conducted in conjunction with the 2001 Progress in International Reading Literacy Study (PIRLS-01).¹⁸ Data collection for the Trends students in 2001 used the same instruments as those from the earlier 1990-1991 study. This report has detailed the results of the 2001 Trends study, comparing the reading literacy skills of New Zealand Year 5 students in 2001 with those of 'standard 3' students in 1990. Contextual information such as students' demographic background, as well as their reading habits, and their views on reading were also discussed. Where possible, some comparisons were made with other countries in the study.

Trends in Reading Literacy Achievement

Contrary to some commentary that *New Zealand children's performance in reading has decreased in recent years*,¹⁹ the results from the Trends study show that there is no evidence to support this notion. Firstly, the mean performance of Year 5 students in 2001 (502) was about the same as the mean performance of their 1990 counterparts (498). Secondly, in New Zealand the range in scores – the difference between the 5th and 95th percentiles – was virtually the same in 1990 (368) as in 2001 (367). Perhaps of concern, is that there was no narrowing of New Zealand's relatively large distribution of scores, particularly at the lower end of the range (i.e. amongst the lowest-performing students.) There was, however, some improvement on one of the sub-domains, *document* texts, although there was no change in performance on other two sub-domains *narrative* and *expository* texts from 1990 to 2001.

Trends study countries, Greece, Slovenia, Iceland, and Hungary, had lower mean reading scores than New Zealand in 1990-1991, but recorded significant increases in mean achievement in 2001. Sweden on the other hand, with a higher mean reading achievement than New Zealand in 1990-1991, showed a significant decrease in 2001.

¹⁸ New Zealand's results pertaining to PIRLS-01 is the subject of a separate report (see Caygill & Chamberlain, 2004).

¹⁹ NZ kids plummet in reading survey. (2003, 10 April). *The Dominion Post*; Kiwi literacy standards drop. (2003, 1 May). *Massey University News*.

While reference to some of the contextual information collected in PIRLS-01 is used to support findings from the Trends study, the PIRLS-01 achievement scores are not directly comparable with the Trends study achievement scores. That is, the New Zealand mean score of 529 on PIRLS is not directly comparable to the mean of 502 for the Trends study. The two studies are based on different frameworks, implemented around different designs, and students were assessed on different assessment questions. However, both studies were based on the same definition and understanding of *reading literacy* and how to best to assess this notion.

Trends in Student Characteristics, Reading Behaviours and Attitudes

The Year 5 girls' and boys' mean reading achievement was about the same in 2001 as that of their respective counterparts in 1990. In 2001, as observed in 1990, the mean achievement of Year 5 girls was significantly higher than the mean achievement of the boys. It is of some concern that there has been no marked change in the magnitude of the difference between girls and boys over the decade.

There was little change in the mean achievement of Pakeha/European, Maori, and Pasifika students over the decade, although a significant increase in the mean achievement of the *Other* ethnic grouping was observed. In 1990, Pakeha/European students, on average, performed significantly higher than their counterparts in the Maori, Pasifika, and *Other* ethnic groupings. A decade later, the difference in mean achievement between Pakeha/European students and students in the *Other* ethnic grouping was not significant.

Alongside the demographic changes that have occurred in the school population during the period 1990-2001, the proportion of Year 5 students reporting that they *rarely* spoke English at home increased significantly. On a positive note though, the difference between the average performance for those students who regularly spoke English at home and those who rarely did decreased from 96 in 1990 to 71 in 2001 (about a quarter of a standard deviation).

Proportionately more Year 5 students were in large schools (schools with 400 or more students) in 2001 than in 1990. However, there was no significant change in the average performance of students in large schools. Similarly, the average performance of students in medium- and small-sized schools in 2001 was about the same as their counterparts in these school-size bands in 1990. While the size of school did not appear to be associated with changes in achievement, there was some change according to urban-rural location. The mean achievement of rural students decreased significantly over the decade, and this was accompanied by a small, albeit non-significant increase in the mean achievement of urban students in 1990. Furthermore, the relatively large difference between the average reading performance of rural and urban students in 1990 was no longer apparent in 2001.

Year 5 students in 2001 were reading books for fun with about the same frequency as their 1990 counterparts, but they were generally watching less television than students were in 1990.

In terms of rating their reading ability, the 2001 cohort were more likely than their 1990 counterparts to view themselves as very good readers. Students' views on the best ways to become a good reader did not change markedly over the period. *Having lots of time to read* and *liking it* were the two most popular ways identified in both 1990 and 2001. Interestingly, proportionately more Year 5 students in 2001 than in 1990, identified *knowing how to sound out words*, making it the third most popular view on how to become a good reader.

Trends in the Home Context for Reading Achievement

When the numbers of items in the home, a surrogate measure of wealth used in each assessment, were compared, proportionately more students in 2001 than in 1990 had a large number of the listed items. Students with more home possessions typically had higher reading achievement than those who had few items. There was little change in the number of personal possessions of students over this time.

Not surprisingly, students were more likely to report the presence of a computer in their homes in 2001 than in 1990, while a place for a student to study was also more common. As was the case in 1990, the 'educational resources', a computer and books in the home, were positively associated with reading achievement.

There was a small change in students' reports of book borrowing from 1990 to 2001, with students in 2001 more likely to borrow books monthly and less likely to borrow weekly than their counterparts were in 1990. Results from both studies show that students who borrowed books **regularly** (at least *monthly*) had higher reading achievement on average than those who rarely or never borrowed books.

Proportionately more students were reading aloud to someone at home three or more times a week in 2001 than in 1990 (41% in 1990 to 47% in 2001). The frequency with which students read aloud was negatively associated with reading achievement. That is, students who read aloud regularly tended to have lower reading achievement than students who reported reading aloud less regularly.

Trends in Classroom Reading Activities

The reading activities undertaken by Year 5 students, with a couple of exceptions, had changed very little over the decade. Reading story books was an activity proportionately fewer Year 5 students in 2001 reported doing daily, while proportionately more Year 5 students reported writing about their reading on a regular basis.

Students' perceptions of the amount of reading homework they received, and their expectations of what they would do for reading homework, had changed little over the 11-year period from 1990 to 2001.

Future work

The government's Literacy Strategy was introduced to schools in 2000, 18 months prior to the Trends Study and PIRLS-01 assessments. It was therefore too early to see any discernible impact of that strategy on the results from either study. Results from the Trends study have provided evidence to show that New Zealand's middle-primary students were performing at least as well as their 1990 counterparts. PIRLS-01 will now serve as benchmark against which data collected in the next cycle of PIRLS, to be conducted in 2005, will be compared. This subsequent cycle will help determine the extent to which policies and practices have changed since the introduction of the professional development programmes and new resources and whether or not this has impacted upon achievement. It will also allow us to see how far New Zealand is toward achieving the government's goal of success for all 9-year-olds in reading, writing, and mathematics by 2005.

APPENDIX A: Reference Material for Chapter 1

A.1 Nature and work of the International Association for the Evaluation of Educational Achievement (IEA)

The Trends study was conducted under the auspices of the International Association for the Evaluation of Educational Achievement (IEA), a non-profit organisation founded in 1959. The purpose of IEA is to conduct comparative studies focusing on educational policies and practices in various countries around the world.

New Zealand has been involved in IEA since the Six-Subject Survey in the early 1970s, the first IEA study to include an assessment of reading. The Six-Subject Survey also included Science, Literature, French as a Foreign Language, English as a Foreign Language and Civics Education. Other studies, which New Zealand has participated in, include:

- Second International Mathematics Study (SIMS) in 1981;
- Written Composition Study in 1984;
- Computers in Education in 1989;
- Reading Literacy in 1990;
- Second Information Technology in Education Study (SITES) in 1998;
- Trends in International Mathematics and Science Study (TIMSS), 1994-1995,²⁰ and 1998-1999.²¹

New Zealand is currently participating in TIMSS 2002-2003, which had the main data collection in New Zealand in November 2002, and preparing for PIRLS 2005 which will have the main data collection in New Zealand in October and November.

A.2 Trends study test design

The assessment was designed so that it covered a range of reading materials in each of the three test domains. In particular, the expository and document reading materials were drawn from typical home, school, society or work contexts. Most of the assessment questions were four-option multiple-choice items with only six questions requiring written responses (see Table A.2.1). The first booklet began with a timed word recognition test with forty words, each word accompanied by four pictures. However the word recognition test, while administered in both 1990 and 2001, was not included in the overall student results. In addition, the two open-ended questions requiring paragraph length responses, one associated with a narrative text, the other associated with an expository text, were not included in the students' results. The four remaining questions requiring written responses were associated with a document text; these were completion-type items requiring one or two word answers.

²⁰ Originally known as the Third International Mathematics and Science Study.

²¹ Originally known as the Repeat of the Third International Mathematics and Science Study (TIMSS-R).

Overall, 66 of the administered items were included in the students' results and the types of texts along with the formats of the items are detailed in Table A.2.1.

Table A.2.1: Number of passages and items in the Trends assessment

Text type	Number of passages	Number of multiple-choice items	Number of short answer items	Number of extended-response items
word recognition	--	40*	--	--
narrative	4	22	--	1*
expository	5	21	--	1*
document	6	19	4	--

Note: * These questions were administered in both 1990 and 2001 but are not included in students' results.

In addition to ensuring the assessment texts and questions covered the three text types, the blueprint for the assessment also included the comprehension processes that students were likely to use in answering the questions. The five comprehension processes were entitled *verbatim*, *paraphrase*, *inference*, *locate information* and *locate and process*. Table A.2.2 gives the blueprint of the assessment showing both the text types and processes for the questions.

Table A.2.2: Blueprint of items by text type and process in the Trends assessment

Text type	Verbatim	Paraphrase	Inference	Locate information	Locate and process	Total
narrative	1	11	10	--	--	22
expository	7	9	5	--	--	21
document	--	--	--	11	12	23
total items	8	20	15	11	12	66

Note: The word recognition and extended-response items that were not included in the student's results are not included in this table.

Source: Martin, Mullis, Gonzalez, & Kennedy (2003).

The test items were allocated a total testing time of 75 minutes. All the test items were administered to each student in two separate testing sessions. The first session, booklet one, was administered over 35 minutes. After a break, the second session, booklet two, was assigned 40 minutes of administration time. A selection of items can be found in A.4 in this Appendix.

A.3 Sample²²

In order to measure trends since 1990, the population definition used at that time was retained for the 2001 Trends study. The international desired target population was defined as:

“All students attending school on a full-time basis at the grade level in which the majority of students are ages 9 years to 9 years 11 months at the eighth month of the school year.” (Wagemaker, 1993, p. 24)

In 1990 the defined national target population for New Zealand was *all students attending school in standard 3 on a full-time basis*. As the class-level nomenclature was used infrequently in schools in 2001, the target population definition was:

All students who were scheduled to begin secondary school (Year9/Form 3) in 2005.

²² Sampling for the Trends study and PIRLS-01 took place at the same time using the same sampling frame.

The new definition still referred to students who would once have been called standard 3 students. These students were usually Year 5 students and are referred to as such throughout this report.

Sampling in 1990

The sampling process used in 1990 is summarised in Wagemaker (1993). Schools were selected at random from a stratified sampling frame using probability proportional to size. From within each of the selected schools, a class at the appropriate age/grade level was selected. As shown in Table A.3.1 stratification in 1990 was based on the location (area of the country) and school type (full primary or contributing). Note that for the purposes of stratification, area schools were included in the category *full primary*.

Table A.3.1: Strata used in New Zealand in the 1990 study of reading literacy

Stratum number	Stratum name
1	Northland full primary
2	Northland contributing
3	Auckland North full primary
4	Auckland North contributing
5	Auckland South full primary
6	Auckland South contributing
7	Waikato full primary
8	Waikato contributing
9	Bay of Plenty full primary
10	Bay of Plenty contributing
11	Central West full primary
12	Central West contributing
13	Central East full primary
14	Central East contributing
15	Central South full primary
16	Central South contributing
17	South Island North/Westland full primary
18	South Island North/Westland contributing
19	Canterbury full primary
20	Canterbury contributing
21	Otago full primary
22	Otago contributing
23	Southland full primary
24	Southland contributing

Source: Wagemaker (1993).

In 1990, while exclusions were permitted, they were required to be kept to a minimum. New Zealand excluded all students in: the Correspondence School; Department of Social Welfare special schools; Department of Education special schools; the New Zealand Foundation for the Blind School; and those students with severe physical and mental handicaps for whom a written assessment of the type proposed would not have been a valid form of assessment. This resulted in three percent of students overall being excluded from the study. As a result of the selection process, 176 schools and 3016 students took part in the 1990 study of reading literacy.

The sampling referee for the 1990 study, Dr Kenneth Ross of Deakin University was responsible for establishing sampling procedures and monitoring the results.

Sampling in 2001

For the 2001 sample, schools were also selected at random from a stratified sampling frame using probability proportional to size. Samples for both the Trends study and the PIRLS-01 study were drawn simultaneously. From within the selected schools, classes with Year 5 students were selected randomly to take part in the study. The selected class or group of Year 5 students took part in either the Trends study or PIRLS-01.

There were two types of strata used for the sampling frame, explicit, requiring a specific number of schools from each strata, and implicit, giving an order to the strata so that some schools were likely to be selected from each of the implicit strata. The explicit strata were based on size and type. These were:

- Kura Kaupapa Maori and other Maori immersion schools;
- schools in major urban locations; and
- schools not in major urban locations.

However, for the Trends study, no schools were sampled from the first explicit strata, the Kura Kaupapa Maori and other Maori immersion schools. The implicit strata for the non-Maori schools were based on a socio-economic indicator of school intake, namely school decile. Once the frame was constructed the sample was selected using probability proportional to size. At this time two replacement schools were also selected so that should a school decline or be otherwise unavailable to take part there would be another similar school available to take its place.

A class was defined as a cluster of students in the target grade (Year 5). Often these clusters were found within composite classes (multi-level classes with a combination of Years 4, 5 and 6 for example). In schools with more than one composite class, where at least one of the classes had less than seven Year 5 students, pseudo classes were created by combining the Year 5 students from two classes. The pseudo class was then counted as one class for sampling purposes. Where possible, two classes were selected, one to take part in PIRLS-01, and one to do the Trends study. If only one class containing Year 5 students was available in a particular school, a class would be selected from the replacement school to do the Trends study.

As a result of this selection process, 169 schools, and 3676 students took part in the two studies (see Table A.3.2). In particular, 73 schools and 1188 students took part in the Trends study.

Table A.3.2: Participation in the Trends study and PIRLS-01 in 2001

Participants	Trends study only	PIRLS-01 only	Trends study and PIRLS-01	Total
schools	13	96	60	169
students	1188	2488	0	3676

For the purposes of sampling, some schools and some students were excluded from the national defined population. In particular, schools that offered a curriculum, or school structure, that differed from the mainstream educational system were excluded. In New Zealand these were: Special Needs schools, the Correspondence School and Rudolf Steiner schools. Countries were also allowed to exclude very small schools for practical reasons. In New Zealand schools with less than four students in Year 5 were excluded. Within schools, students who were physically or mentally unable to perform in the test were excluded. This did not include students who were merely poor academically or those who had discipline problems. Also students were excluded from the testing if they were non-English speakers and had received less than one year of instruction in English. Overall, 2.9 percent of the New Zealand national desired population was excluded. Internationally, overall exclusion rates ranged from 0.9 percent to 6.0 percent.

Statistics Canada, in consultation with the PIRLS sampling referee, Keith Rust, Westat Inc., rigorously monitored the sampling and exclusion process. All countries used replacement schools to meet sampling requirements, with replacement schools selected at the time of sampling because they had very similar student populations to the school that declined to participate. It is important to remember that schools decline to participate for various reasons and not necessarily based on performance. For participation rates for all Trends countries see Table A.3.3. The sampling methodology therefore ensured that the population estimates for participating countries are likely to be as good as if no school had declined to participate.

Table A.3.3: Participation rates for all countries in the Trends study in 2001

Country	Participation rate (%)				
	School participation before replacement	School participation after replacement	Student participation	Overall participation before replacement	Overall participation after replacement
Greece	73	79	97	70	77
Hungary	98	98	97	96	96
Iceland	93	93	87	80	80
Italy	89	100	97	86	97
New Zealand	90	98	95	85	93
Singapore	100	100	98	98	98
Slovenia	100	100	95	95	95
Sweden	96	100	97	93	97
United States	58	85	95	55	81

Source: Martin, Mullis, Gonzalez, & Kennedy (2003).

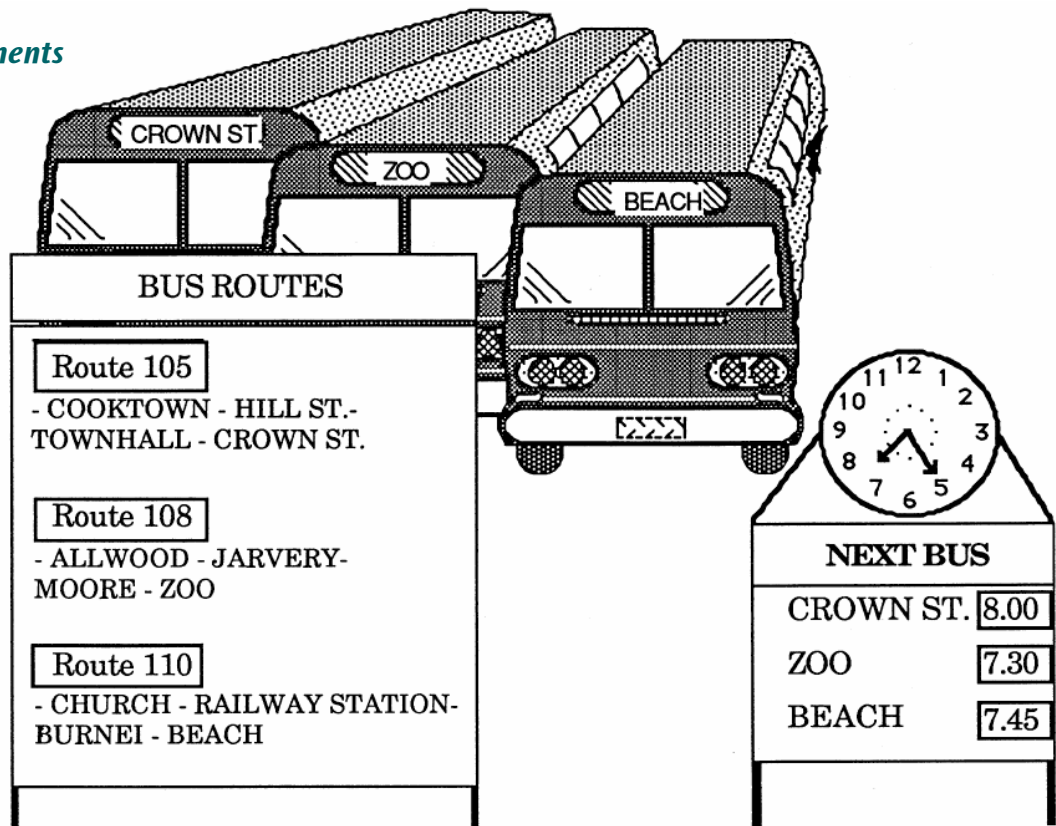
A.4 A selection of items used

Three reading passages and associated questions from the Trends study are presented in this appendix. The reading passages selected, *Buses*, *Grandpa*, and *How to Read The Age of a Tree*, are reprinted with permission from IEA. Note that the font size and spacing have been reduced in size for presentation here in this report. The percentage of New Zealand students answering correctly in both 1990 and 2001, as well as the mean percentage correct for all nine trend countries are also presented.

The three passages have been selected for this report to illustrate the range of questions associated with each text. Questions required students to demonstrate different comprehension skills in order to answer correctly. The first passage, *Buses*, is an example of a text from the Documents domain. The second passage *Grandpa*, is an

example of a passage from the Narrative domain, and the third, *How to read the age of a tree* is an example of a Expository domain text. Questions (or items) associated with *Buses* were in a short-answer format, while the question format of the latter two passages was multiple-choice.

Buses
Domain: Documents



1. Anne wants to go to the railway station. Which route number should she choose?

Route: 110

Country grouping	Percentage correct	
	1990	2001
New Zealand	85	85
Mean - all 9 countries	84	87

2. Where do you think the bus stops first on Anne's way to the railway station?

Church

Country grouping	Percentage correct	
	1990	2001
New Zealand	64	63
Mean - all 9 countries	61	66

3. How long will it be before the next bus leaves for the zoo?

5 minutes

Country grouping	Percentage correct	
	1990	2001
New Zealand	19	29
Mean - all 9 countries	20	24

4. What is the name of the place where buses stop just before the zoo?

Moore

Country grouping	Percentage correct	
	1990	2001
New Zealand	40	44
Mean - all 9 countries	50	53

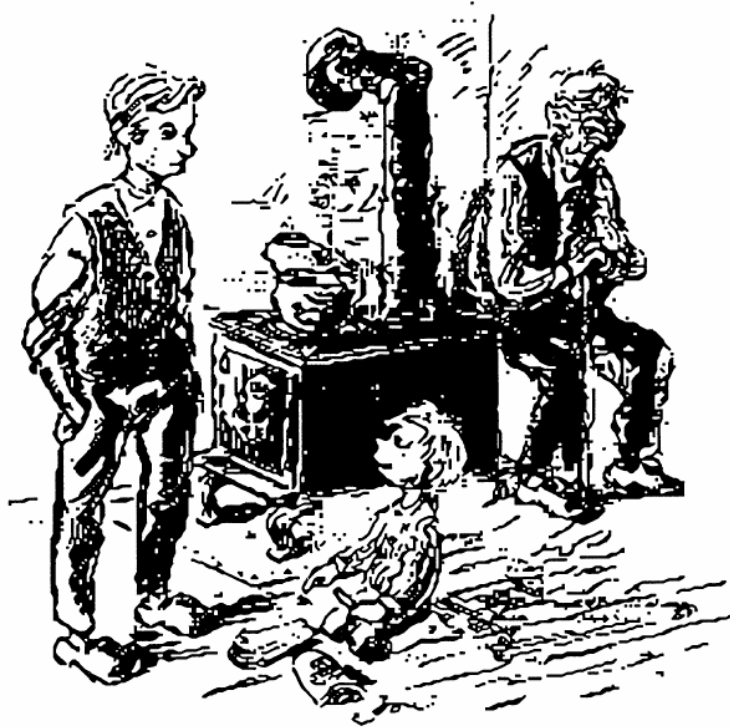
Grandpa **Domain: Narrative**

Once upon a time, there was a very old man. His eyes had become weak. His ears were deaf, and his knees would shake. When he sat at the table, he was hardly able to hold the spoon. He spilled soup on the tablecloth, and he often slobbered.

He lived with his son and daughter-in-law. They also had a small boy who was four years old, so the old man was a grandfather.

His son and his son's wife found it disgusting to see him spilling food at the table. And so they finally ordered him to sit in a corner behind the stove. Here, they served him his food on a small earthenware plate. Now, Grandpa didn't even get enough to satisfy his hunger. He sat there feeling sad. He looked at the table, where the others were eating, and his eyes filled with tears.

Then, one day his shaking hands could not even hold the plate. It fell to the floor, and was broken into many pieces. The young wife scolded him. But the old grandfather said nothing. He just sighed. Then the young wife bought him a very cheap wooden bowl. Now he had to eat from that.



One day, while they were having dinner, the grandchild sat on the floor, and was very busy with some small pieces of wood.

“What are you doing?” asked his father.

“I am making a bowl,” the boy answered.

“What is it for?”

“It is for my father and mother to eat from when I grow up.”

The man and his wife looked at each other for a long time. Then, they started crying. At once, they asked the old grandpa back to the table, and from then on he always ate with them. After that, even if he sometimes spilt his food, they never said a word about it.

1. What happened when the grandfather sat at table?

- A He always had a good meal.
- B His feet would shake.
- C He spilled his soup.
- D He dropped his plate.

Country grouping	Percentage correct	
	1990	2001
New Zealand	70	70
Mean - all 9 countries	71	70

2. The son and his wife asked Grandpa to sit behind the stove because...

- A it was warmer there.
- B the table was not big enough for everyone.
- C he could not see or hear.
- D they did not like to see him eat.

Country grouping	Percentage correct	
	1990	2001
New Zealand	70	67
Mean - all 9 countries	69	67

3. Why did the son's wife scold the grandfather?

- A He spilled his soup.
- B He broke his plate.
- C He looked so sad.
- D He showed bad manners.

Country grouping	Percentage correct	
	1990	2001
New Zealand	65	62
Mean - all 9 countries	66	64

4. Grandfather was given a new bowl made of wood because...

- A he had wanted such a bowl.
- B the family had no more earthenware plates.
- C a wooden bowl does not break so easily.
- D the boy had made one for him.

Country grouping	Percentage correct	
	1990	2001
New Zealand	68	68
Mean - all 9 countries	66	65

5. How did grandfather feel when he sat by the stove?

- A Bored.
- B Tired.
- C Pleased.
- D Unhappy.

Country grouping	Percentage correct	
	1990	2001
New Zealand	81	77
Mean - all 9 countries	70	70

6. The son and his wife cried because...

- A the boy could not make a wooden bowl.
- B their old father could not eat properly.
- C they understood that they too would grow old.
- D the wooden bowl was also broken.

Country grouping	Percentage correct	
	1990	2001
New Zealand	63	58
Mean - all 9 countries	61	60

How to Read the Age of a Tree

Domain: Expository

If you can find a tree which has been cut down, you will see many rings on the base of the trunk. By learning to read these rings, you can find out about the tree's life.

The number of rings tells you how old the tree is. Each year, new wood is formed on the outside of the tree. This new wood is light in colour when the tree is growing in the spring and summer, and dark in winter when the tree is not growing much. So, if you count the rings of dark-or-light-coloured wood, you can often find out how old the tree is.

You can also tell which years have been good years and which years have been bad years. When the light-coloured rings are very wide, it means that the tree has been growing quickly that year. If the light rings are narrow, it has been growing slowly.

If the rings on a tree trunk were greatly magnified, you would be able to see why the rings are light-coloured when the tree is growing quickly, and dark-coloured when the tree is growing slowly. The tree trunk is made up of microscopic tubes, like long pipes, carrying water and minerals from the soil, through the trunk, and up to the leaves. They are wide and thin-walled when the tree is growing quickly and they are carrying a lot of water. They are narrow and bunched together when the tree is not growing so quickly.

When a tree is old, the tubes in the centre of the tree don't carry water. The walls of the tubes have become thick with materials which have stuck along them over the years forming a special kind of wood, called "heartwood". This kind of wood is darker in colour than the young, growing wood on the outside of the tree.

You don't very often see whole tree trunks which have been cut across. But once you learn to read a cross section of the wood, you can see much more in wood which has been used to make boxes, furniture, houses, and other things.

In most wood, instead of seeing the trunk cut across, you are seeing it cut along its length. Because you don't see the whole tree, you can't tell how old it was.

1. The writer says you can tell the age of a tree by...

- A the number of rings in its trunk.
- B the size of the base of its trunk.
- C its height.
- D the rings on its outside bark.

Country grouping	Percentage correct	
	1990	2001
New Zealand	75	76
Mean - all 9 countries	66	69

2. When the wood of a tree is mostly light in colour, this means that the tree...

- A grew quickly.
- B grew slowly.
- C only grew in winter.
- D only grew in summer.

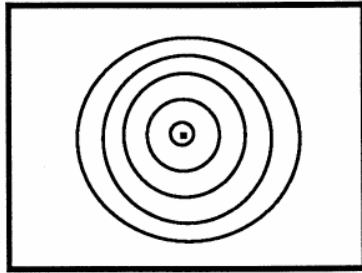
Country grouping	Percentage correct	
	1990	2001
New Zealand	49	50
Mean - all 9 countries	48	50

3. Heartwood is wood which is...

- A older and darker.
- B fast-growing.
- C younger and lighter.
- D slow-growing.

Country grouping	Percentage correct	
	1990	2001
New Zealand	53	57
Mean - all 9 countries	48	50

4. In the cross section of the tree trunk shown in Box 1, all the rings are wide and about the same width. This shows that the tree...

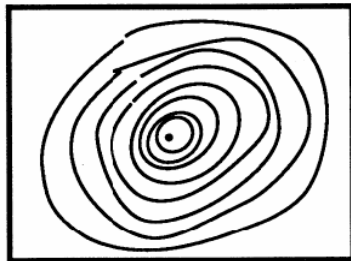


BOX 1

- A grew quickly all its life.
- B grew slowly all its life.
- C grew quickly when it was young and more slowly later.
- D grew slowly when it was young and more quickly later.

Country grouping	Percentage correct	
	1990	2001
New Zealand	41	43
Mean - all 9 countries	37	41

5. How many years old is the tree shown in Box 2?

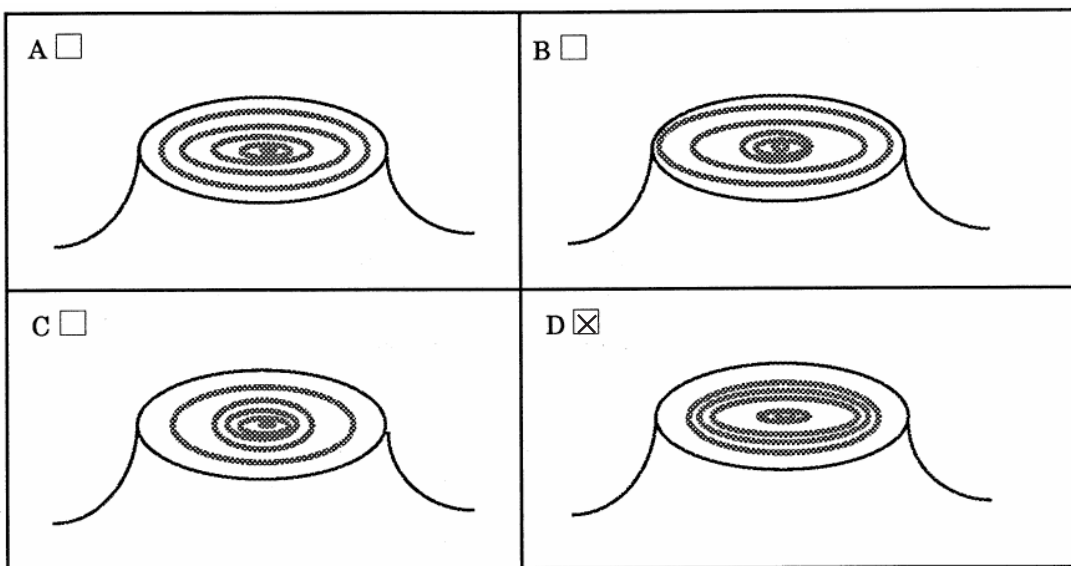


BOX 2

- A Less than 6
- B 9
- C 12
- D More than 12

Country grouping	Percentage correct	
	1990	2001
New Zealand	69	68
Mean - all 9 countries	55	62

6. In a country which has a dry climate, it rains heavily every third year. Which drawing shows a tree trunk from this country?



Country grouping	Percentage correct	
	1990	2001
New Zealand	29	33
Mean - all 9 countries	26	27

APPENDIX B: Reference Material for Chapter 2

Table B.1: Percentiles of reading achievement for the Trends study countries in 1990-1991 and 2001

Countries	1990-1991					
	5 th percentile	25 th percentile	50 th percentile	75 th percentile	95 th percentile	Range [®]
Sweden	297	445	524	592	687	390
New Zealand	296	434	507	575	664	368
Iceland	291	425	497	558	635	345
Italy	324	438	505	566	660	336
Slovenia	297	391	459	525	612	316
Greece	305	408	472	527	614	309
Hungary	297	397	464	526	603	306
Singapore	327	425	485	540	620	293
United States	371	459	524	585	663	292

Countries	2001					
	5 th percentile	25 th percentile	50 th percentile	75 th percentile	95 th percentile	Range [®]
Sweden	294	424	506	578	673	379
New Zealand	305	428	513	579	672	367
Singapore	305	418	493	565	653	348
Hungary	305	410	481	546	622	317
Iceland	346	455	521	578	656	310
Italy	355	450	517	578	657	302
Slovenia	339	432	495	557	641	302
Greece	346	451	512	569	648	302
United States	354	448	514	579	656	302

Note: [®] The range refers to the difference between the 5th and the 95th percentiles. Some results may appear inconsistent due to rounding.

Source: Martin, Mullis, Gonzalez, & Kennedy (2003).

Table B.2: Mean reading literacy scores for New Zealand and the other Trends study countries in 1990 and 2001

Countries	1990-1991	
	Mean reading score (s.e.)	Difference (s.e.) between country mean and New Zealand mean
United States	521 (3.2)	22 (5.2) ▲
Sweden	513 (4.2)	15 (5.9) ▲
Italy	500 (5.4)	2 (6.7) ●
New Zealand	498 (4.1)	
Iceland	486 (1.5)	-12 (4.4) ▼
Singapore	481 (3.6)	-18 (5.5) ▼
Greece	466 (4.5)	-32 (6.1) ▼
Hungary	459 (4.0)	-39 (5.7) ▼
Slovenia	458 (3.2)	-41 (5.2) ▼

Countries	2001	
	Mean reading score (s.e.)	Difference (s.e.) between country mean and New Zealand mean
Iceland	513 (3.5)	11 (6.4) ●
Italy	513 (4.4)	10 (6.9) ●
United States	511 (6.3)	9 (8.2) ●
Greece	507 (5.9)	5 (7.9) ●
New Zealand	502 (5.3)	
Sweden	498 (3.9)	-4 (6.6) ●
Slovenia	493 (3.7)	-9 (6.5) ●
Singapore	489 (7.9)	-14 (9.6) ●
Hungary	475 (3.9)	-27 (6.6) ▼

Key: ▲ Country mean is significantly higher than New Zealand mean.
▼ Country mean is significantly lower than New Zealand mean.
● Country mean is not significantly different from New Zealand mean.

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1. Some results may appear inconsistent due to rounding.

Table B.3: Mean scores on narrative, expository, and document reading texts for the Trends study countries in 1990-1991 and 2001

Country and text type		Mean reading score (s.e.)		Difference (s.e.) between mean scores for 1990-1991 and 2001
		1990-1991	2001	
Greece	narrative	479 (3.7)	513 (4.8)	34 (6.0) ▲
	expository	476 (4.3)	509 (5.2)	33 (6.8) ▲
	document	443 (4.9)	490 (5.2)	48 (7.1) ▲
Iceland	narrative	493 (1.6)	524 (3.3)	31 (3.8) ▲
	expository	483 (1.9)	502 (3.3)	18 (3.9) ▲
	document	479 (1.7)	506 (3.4)	28 (4.0) ▲
Slovenia	narrative	465 (3.0)	490 (3.7)	25 (4.8) ▲
	expository	455 (3.6)	489 (3.3)	34 (4.9) ▲
	document	456 (3.0)	502 (3.8)	47 (4.9) ▲
Hungary	narrative	467 (3.2)	479 (3.1)	12 (4.5) ▲
	expository	443 (4.8)	464 (4.4)	21 (6.4) ▲
	document	468 (4.3)	486 (3.7)	18 (5.6) ▲
Italy	narrative	507 (4.7)	517 (4.1)	10 (6.2)
	expository	507 (5.5)	513 (4.5)	6 (7.1)
	document	482 (5.4)	499 (4.5)	17 (6.9) ▲
Singapore	narrative	486 (3.5)	487 (8.6)	1 (9.3)
	expository	489 (3.1)	495 (6.6)	6 (7.3)
	document	465 (3.1)	484 (6.8)	18 (7.5) ▲
New Zealand	narrative	500 (4.3)	496 (5.3)	-5 (6.9)
	expository	502 (3.9)	510 (5.3)	8 (6.5)
	document	491 (4.0)	506 (5.2)	16 (6.3) ▲
Sweden	narrative	513 (3.4)	496 (3.6)	-17 (4.8) ▼
	expository	519 (4.4)	496 (4.1)	-23 (6.1) ▼
	document	504 (4.5)	506 (4.4)	2 (6.4)
United States	narrative	518 (3.3)	498 (6.8)	-20 (7.7) ▼
	expository	516 (3.2)	521 (5.4)	5 (6.2)
	document	527 (3.2)	520 (6.1)	-7 (6.6)

Key: ▲ The mean for 2001 is significantly higher than the mean for 1990-1991.

▼ The mean for 2001 is significantly lower than the mean for 1990-1991.

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1. Some results may appear inconsistent due to rounding.

Source: Martin, Mullis, Gonzalez, & Kennedy (2003).

APPENDIX C: Reference Material for Chapter 3

Table C.1: Mean reading literacy scores for Year 5 students in 1990 and 2001, by gender

Year	Mean reading score (s.e.)		Difference (s.e.)
	Girls	Boys	
1990	514 (5.0)	485 (5.4)	29 (6.3) *
2001	520 (7.0)	485 (6.6)	35 (8.7) *

Note: An * indicates that the difference was significant.
(s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.

Table C.2: Percentiles of reading literacy achievement for Year 5 students in 1990 and 2001, by gender

Gender by year		5 th percentile	25 th percentile	50 th percentile	75 th percentile	95 th percentile	Range [®]
girls	1990	331	453	521	584	668	337
	2001	339	456	526	593	681	342
boys	1990	279	416	492	568	658	379
	2001	281	404	497	568	663	382

Note: [®] The range refers to the difference between the 95th and the 5th percentiles.

Table C.3: Mean scores on narrative, expository, and document reading texts in 1990 and 2001, by gender

Text type	Mean reading score (s.e.)					
	Girls			Boys		
	1990	2001	Difference (s.e.)	1990	2001	Difference (s.e.)
narrative	521 (5.1)	518 (7.0)	-3 (8.6)	483 (5.5)	474 (6.5)	-9 (8.4)
expository	515 (4.9)	524 (7.0)	9 (8.3)	492 (5.2)	497 (6.6)	5 (8.6)
document	499 (4.7)	520 (7.3)	21 (8.6) *	484 (5.5)	493 (6.5)	9 (8.4)

Text type	Mean reading score (s.e.)					
	1990			2001		
	Girls	Boys	Difference (s.e.)	Girls	Boys	Difference (s.e.)
narrative	521 (5.1)	483 (5.5)	38 (6.1) *	518 (7.0)	474 (6.5)	45 (8.5) *
expository	515 (4.9)	492 (5.2)	22 (6.5) *	524 (7.0)	497 (6.6)	27 (8.7) *
document	499 (4.7)	484 (5.5)	15 (6.3) *	520 (7.3)	493 (6.5)	27 (9.3) *

Note: An * indicates that the difference was significant.
(s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.

Table C.4: *t*-values for comparing the reading literacy scores for 1990 and 2001, by ethnic grouping

Ethnic grouping	Difference (s.e.) between mean scores from 1990 to 2001	<i>t</i> -value
Pakeha/European	7 (6.8)	1.00
Maori	-13 (11.6)	-1.12
Pasifika	9 (22.3)	0.42
<i>Other</i>	43 (22.1)	1.96

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.
Missing ethnicity data for 3% of students in both 1990 and 2001.

Table C.5: *t*-values for comparing mean reading literacy scores among ethnic groupings in 1990 and 2001

Ethnic grouping in 1990		Pakeha/European	Maori	Pasifika	Other
1990	Pakeha/European	-----	9.44	6.07	2.59
	Maori	-9.44	-----	1.75	-1.81
	Pasifika	-6.07	-1.75	-----	-2.59
	Other	-2.59	1.81	2.59	-----
Ethnic grouping in 2001		Pakeha/European	Maori	Pasifika	Other
2001	Pakeha/European	-----	7.99	4.71	0.11
	Maori	-7.99	-----	0.09	-4.40
	Pasifika	-4.71	-0.09	-----	-4.93
	Other	-0.11	4.40	4.93	-----

Note: Missing ethnicity data for 3% of students in both 1990 and 2001.

Table C.6: *t*-values for comparing mean scores for narrative, expository, and document reading texts between 1990 and 2001, by ethnic grouping

Ethnic grouping by text types	Mean reading score (s.e.)		<i>t</i> -value difference
	1990	2001	
narrative texts			
Pakeha/European	523 (4.0)	523 (6.2)	-0.01
Maori	461 (6.7)	439 (10.3)	-1.78
Pasifika	439 (13.4)	435 (17.1)	-0.19
Other	494 (14.5)	515 (13.7)	1.06
expository texts			
Pakeha/European	524 (3.8)	535 (5.4)	1.70
Maori	467 (6.3)	461 (9.1)	-0.52
Pasifika	445 (12.0)	452 (15.6)	0.35
Other	492 (14.3)	531 (12.2)	2.06 *
document texts			
Pakeha/European	514 (4.1)	532 (6.1)	2.53 *
Maori	454 (6.4)	453 (10.1)	-0.08
Pasifika	426 (12.8)	458 (17.8)	1.48
Other	471 (15.3)	528 (14.7)	2.67 *

Note: An * indicates that the difference was significant.
(s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.
Missing ethnicity data for 3% of students in both 1990 and 2001.

Table C.7: Mean reading literacy scores for Year 5 girls and boys in 1990 and 2001, by ethnic grouping

Text type	Mean reading score (s.e.)					
	Girls			Boys		
	1990	2001	Difference (s.e.)	1990	2001	Difference (s.e.)
Pakeha/European	536 (4.6)	545 (6.4)	9 (8.0)	511 (6.2)	514 (7.8)	3 (10.0)
Maori	479 (7.9)	472 (10.0)	-7 (13.1)	438 (7.4)	416 (13.4)	-22 (15.3)
Pasifika	457 (14.1)	449 (31.9) [#]	-8 (34.4)	415 (18.7)	438 (16.4) [#]	23 (25.0)
Other	478 (24.5) [#]	553 (22.9) [#]	75 (33.6) [*]	494 (15.4) [#]	512 (16.4)	19 (22.8)

Text type	Mean reading score (s.e.)					
	1990			2001		
	Girls	Boys	Difference (s.e.)	Girls	Boys	Difference (s.e.)
Pakeha/European	536 (4.6)	511 (6.2)	25 (7.3) [*]	545 (6.4)	514 (7.8)	31 (9.7) [*]
Maori	479 (7.9)	438 (7.4)	41 (9.0) [*]	472 (10.0)	416 (13.4)	56 (15.3) [*]
Pasifika	457 (14.1)	415 (18.7)	43 (18.5) [*]	449 (31.9) [#]	438 (16.4) [#]	11 (35.2)
Other	478 (24.5) [#]	494 (15.4) [#]	-15 (29.4)	553 (22.9) [#]	512 (16.4)	41 (23.0)

Note: A # indicates that the mean estimate was calculated using a relatively small (sub) sample; the level of uncertainty around the estimate is reflected in the size of the standard error.

An * indicates that the difference was significant.

(s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.

Missing ethnicity data for 3% of students in both 1990 and 2001.

Table C.8: The extent to which students in the Trends study countries spoke the language of the test at home in 2001 with change since 1990-1991

Countries	Never or hardly ever		Sometimes		Always or almost always	
	Percentage of students in 2001	1990-1991 to 2001 difference	Percentage of students in 2001	1990-1991 to 2001 difference	Percentage of students in 2001	1990-1991 to 2001 difference
Greece	1 (0.4)	-1 (0.7)	7 (1.1)	2 (1.3)	92 (1.2)	-2 (1.7)
Hungary	1 (0.2)	0 (0.4)	1 (0.2)	0 (0.3)	98 (0.3)	1 (0.5)
Iceland	2 (0.3)	1 (0.4) ▲	5 (0.7)	3 (0.7) ▲	93 (0.8)	-4 (0.8) ▼
Italy	12 (0.9)	1 (1.7)	19 (1.4)	4 (2.0)	69 (1.7)	-4 (2.8)
New Zealand	3 (0.6)	1 (0.7)	9 (1.1)	3 (1.4) ▲	88 (1.4)	-4 (1.7) ▼
Singapore	13 (0.8)	0 (1.0)	45 (1.5)	-15 (1.9) ▼	42 (1.8)	14 (2.2) ▲
Slovenia	3 (0.8)	1 (0.9)	8 (1.4)	-1 (1.6)	88 (1.7)	0 (2.0)
Sweden	3 (0.3)	-1 (0.7)	7 (0.9)	1 (1.2)	91 (1.1)	0 (1.6)
United States	3 (0.5)	2 (0.5) ▲	8 (1.2)	6 (1.3) ▲	89 (1.4)	-8 (1.5) ▼

Key: ▲ The percentage for 2001 is significantly higher than the percentage for 1990-1991.

▼ The percentage for 2001 is significantly lower than the percentage for 1990-1991.

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.

Some results may appear inconsistent due to rounding.

Source: Martin, Mullis, Gonzalez, & Kennedy (2003).

Table C.9: The extent to which Year 5 students spoke English at home in 1990 and 2001

Year	Always or almost always		Sometimes or never		Difference (s.e.) between mean scores
	Percent of students	Mean reading score (s.e.)	Percent of students	Mean reading score (s.e.)	
1990	92 (0.9)	507 (4.0)	8 (0.9)	412 (9.8)	96 (9.9) *
2001	88 (1.4)	511 (4.9)	12 (1.4)	440 (14.0)	71 (13.3) *

Note: An * indicates that the difference was significant.
(s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.

Table C.10: The extent to which Year 5 students spoke English at home in 1990 and 2001, by ethnic grouping

Ethnic grouping	Percentage of students in each ethnic grouping who spoke English at home			
	Always or almost always		Sometimes or never	
	1990	2001	1990	2001
Pakeha/European	98 (0.3)	97 (0.7)	2 (0.3)	3 (0.7)
Maori	87 (2.3)	87 (2.7)	13 (2.3)	13 (2.7)
Pasifika	61 (5.0)	54 (6.5)	39 (5.0)	46 (6.5)
Other	60 (6.6)	64 (2.7)	40 (6.6)	36 (2.7)

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.
Adjusted percentages are shown. Missing data for 3% of students in 1990 and 5% in 2001.

Table C.11: Year 5 students' reports on reading during the week prior to the assessment in 1990 and 2001

Material read in week prior to assessment	Percentage of students		Difference (s.e.) between 1990 and 2001	
	1990	2001		
book	66	73	7 (2.5)	▲
magazine	31	32	1 (2.4)	
comic	28	20	-7 (1.9)	▼
newspaper	49	40	-10 (2.4)	▼

Key: ▲ The percentage for 2001 is significantly higher than the percentage for 1990.
▼ The percentage for 2001 is significantly lower than the percentage for 1990.

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.
Some results may appear inconsistent due to rounding.
Adjusted percentages are shown. Missing data for up to 3% of students.

Table C.12: Mean reading literacy scores for Year 5 students in 1990 and 2001, by the frequency of reading books for fun

Frequency of reading books for fun	Mean reading score (s.e.)	
	1990	2001
almost every day	529 (4.3)	540 (6.7)
about once a week	499 (5.6)	497 (7.7)
about once a month	481 (8.0)	466 (11.5)
almost never	432 (8.8)	437 (8.9)

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.
Missing data for 2% of students in 1990 and 3% in 2001.

Table C.13: Year 5 students' reports on time spent watching television or videos in 1990 and 2001

Number of hours watching television or video per day	1990		2001	
	Mean reading score (s.e.)	Percentage of students (s.e.)	Mean reading score (s.e.)	Percentage of students (s.e.)
up to 1 hour	490 (6.3)	24 (1.2)	515 (8.1)	29 (2.0) ▲
from 1 to 3 hours	518 (5.0)	37 (1.1)	517 (8.3)	37 (1.4)
more than 3 hours	487 (5.8)	39 (1.2)	480 (6.8)	33 (2.2) ▼

Key: ▲ The percentage for 2001 is significantly higher than the percentage for 1990.
▼ The percentage for 2001 is significantly lower than the percentage for 1990.

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.
Some results may appear inconsistent due to rounding.
Adjusted percentages are shown. Missing data for 3% of students in both 1990 and 2001.
Source: Martin, Mullis, Gonzalez, & Kennedy (2003).

Table C.14: Year 5 students' self-rating of their reading ability in 1990 and 2001

Student self-rating	1990		2001	
	Percentage of students	Mean reading score (s.e.)	Percentage of students	Mean reading score (s.e.)
not very good	8	358 (10.5)	7	390 (12.5)
average	23	472 (6.4)	19	455 (8.5)
good	35	509 (5.0)	36	495 (7.1)
very good	33	544 (5.4)	39	554 (7.8)

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.
Some results may appear inconsistent due to rounding.
Adjusted percentages are shown. Missing data for 2% of students in 1990 and 3% of students in 2001.

APPENDIX D: Reference Material for Chapter 4

Table D.1: Items reported to be found in the homes of Year 5 students in 1990 and 2001

Items in the home	Percentage of Year 5 students		Difference (s.e.) between 1990 and 2001
	1990	2001	
computer	43	80	37 (2.0) ▲
dishwasher	40	63	23 (2.2) ▲
microwave	69	88	19 (1.5) ▲
second bathroom	32	48	16 (2.9) ▲
video	82	95	12 (1.1) ▲
second car	64	76	12 (2.3) ▲
stereo	89	96	7 (1.0) ▲
television	97	99	1 (0.5) ▲
clothes dryer	77	78	1 (1.8) ●
washing machine	96	95	-1 (0.8) ●

Key: ▲ The percentage for 2001 is significantly higher than the percentage for 1990.
 ▼ The percentage for 2001 is significantly lower than the percentage for 1990.
 ● The percentages for 1990 and 2001 are not significantly different.

Note: Adjusted percentages are shown. Missing data for up to 11% of students.

Table D.2: Number of items reported to be found in the homes of Year 5 students in 1990 and 2001

Number of items in the home	1990		2001	
	Percentage of students	Mean reading score (s.e.)	Percentage of students	Mean reading score (s.e.)
1, 2	3	417 (15.1)	2	~ ~
3, 4	10	463 (9.6)	4	458 (17.2) [#]
5, 6	29	494 (6.1)	15	478 (10.2)
7, 8	37	509 (4.9)	33	497 (7.3)
9, 10	21	523 (5.7)	47	528 (7.3)

Note: A # indicates that the mean estimate was calculated using a relatively small (sub) sample; the level of uncertainty around the estimate is reflected in the size of the standard error.

A tilde (~) indicates insufficient data to report achievement.

(s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.

Listed items were: television, washing machine, stereo, video, clothes dryer, computer, dishwasher, microwave, a second bathroom, and a second car.

Some results may appear inconsistent due to rounding.

Adjusted percentages are shown. Missing data for 3% of students in 1990 and 4% in 2001.

Table D.3: Number of possessions Year 5 students had in 1990 and 2001

Number of student possessions	1990		2001	
	Percentage of students	Mean reading score (s.e.)	Percentage of students	Mean reading score (s.e.)
1, 2	10	466 (9.5)	8	473 (10.6)
3, 4	31	496 (6.6)	29	511 (9.2)
5, 6	41	517 (4.3)	42	512 (6.8)
7, 8	18	490 (6.9)	21	497 (9.3)

Note: Listed items were: my own reading books, my own bicycle, my own bedroom, my own radio, my own camera, my own TV, my own walkman, my own place to study.

Adjusted percentages are shown. Missing data for 3% of students in 1990 and 4% in 2001.

Table D.4: Mean reading literacy scores for the Trends study countries in 1990-1991 and 2001 by the number of books in the home

Country	Mean reading score (s.e.) for those with:							
	0 to 10 books		11 to 50 books		51 to 100 books		More than 100 books	
	1990-1991	2001	1990-1991	2001	1990-1991	2001	1990-1991	2001
Greece	417 (7.6)	473 (10.1)	472 (6.8)	495 (9.9)	488 (5.0)	527 (7.7)	490 (5.7)	519 (6.8)
Hungary	367 (7.9)	389 (6.9)	435 (5.8)	456 (4.8)	458 (5.0)	479 (4.3)	485 (4.2)	507 (3.8)
Iceland	411 (10.8)	437 (16.5)	455 (5.5)	491 (6.8)	486 (3.6)	513 (5.0)	495 (1.8)	524 (3.4)
Italy	445 (7.1)	478 (6.5)	515 (9.1)	509 (5.2)	520 (5.8)	539 (6.2)	514 (6.2)	527 (7.5)
New Zealand	402 (12.6)	397 (12.5)	463 (7.8)	489 (10.4)	493 (5.6)	499 (7.6)	524 (4.0)	525 (6.7)
Singapore	429 (3.8)	403 (7.0)	476 (3.1)	480 (7.6)	493 (4.0)	508 (7.6)	503 (4.5)	509 (9.1)
Slovenia	398 (7.3)	444 (6.9)	436 (4.9)	484 (6.9)	462 (4.3)	498 (6.5)	478 (3.8)	513 (4.5)
Sweden	418 (13.4)	422 (9.6)	471 (9.5)	465 (8.7)	503 (6.0)	493 (5.9)	525 (4.1)	509 (3.2)
United States	463 (5.8)	453 (7.1)	493 (4.4)	493 (7.7)	529 (3.9)	512 (8.2)	537 (3.4)	537 (6.2)

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.

Table D.5: Educational resources in the homes of Year 5 students in 1990 and 2001

Educational resource in the home	Percentage of Year 5 students (s.e.)		
	1990	2001	
own books	95 (0.5)	95 (0.6)	●
own place to study	62 (1.5)	71 (1.3)	▲
computer	43 (1.3)	80 (1.4)	▲
receipt of daily newspaper at home	69 (1.3)	59 (2.3)	▼

Key: ▲ The percentage for 2001 is significantly higher than the percentage for 1990.
 ▼ The percentage for 2001 is significantly lower than the percentage for 1990.
 ● The percentages for 1990 and 2001 are not significantly different.

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.
 Adjusted percentages are shown. Missing data for up to 8% of students.

Table D.6: Educational resources in the homes of Year 5 students in 1990 and 2001, by ethnic grouping

Ethnic grouping	Percentage of Year 5 students (s.e.)							
	Own reading books		Daily newspaper		Computer		Own place to study	
	1990	2001	1990	2001	1990	2001	1990	2001
Pakeha/European	98 (0.4)	97 (0.7)	72 (1.6)	57 (2.3) ▼	47 (1.5)	84 (1.7) ▲	62 (1.8)	69 (1.9) ▲
Maori	90 (1.3)	92 (1.4)	63 (2.4)	63 (3.6)	36 (2.3)	70 (3.1) ▲	60 (2.5)	73 (5.3) ▲
Pasifika	92 (2.5)	90 (4.4)	63 (5.1)	63 (7.5)	29 (5.7)	65 (5.5) ▲	64 (4.3)	73 (5.1)
Other	96 (2.3)	98 (1.5)	69 (6.6)	57 (6.8)	44 (6.5)	92 (2.1) ▲	64 (6.2)	83 (3.1) ▲
All New Zealand	95 (0.5)	95 (0.6)	69 (1.3)	59 (2.3) ▼	43 (1.3)	80 (1.4) ▲	62 (1.5)	71 (1.3) ▲

Key: ▲ The percentage for 2001 is significantly higher than the percentage for 1990.
▼ The percentage for 2001 is significantly lower than the percentage for 1990.

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.
Adjusted percentages are shown. Missing data for up to 11% of students.

Table D.7: Mean reading literacy scores for Year 5 students in 1990 and 2001, by the presence of educational resources in the home

Educational resource	Mean reading score (s.e.)			
	1990		2001	
	Yes	No	Yes	No
own books	505 (4.1)	433 (12.1) ▼	510 (5.4)	420 (17.9) ▼
own place to study	510 (4.7)	488 (5.5) ▼	505 (6.1)	513 (7.9) ●
computer	517 (5.0)	492 (5.2) ▼	519 (5.6)	462 (9.4) ▼
household gets daily newspaper	507 (4.4)	484 (6.7) ▼	497 (6.2)	513 (6.5) ▲

Key: ▲ Students responding "no" have significantly higher mean scores than those responding "yes".
▼ Students responding "no" have significantly lower mean scores than those responding "yes".
● Mean scores are not significantly different.

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.
Adjusted percentages are shown. Missing data for up to 8% of students.

Table D.8: Year 5 students' reports on book borrowing from a school or public library in 1990 and 2001

Level of book borrowing	1990		2001	
	Percentage of students	Mean reading score (s.e.)	Percentage of students	Mean reading score (s.e.)
never or hardly ever	21	468 (8.1)	21	463 (8.3)
monthly or more often	79	508 (4.2)	79	514 (5.6)

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.
Differences between the mean scores for students who never or hardly ever borrowed books and those who borrowed once a month or more often was significant in both 1990 and 2001 with *t*-values of 5.15 and 6.14 respectively.

Table D.9: Frequency with which Year 5 students read aloud in English to someone at home in 1990 and 2001

Frequency of reading aloud in English to someone at home	Mean reading score (s.e.)	
	1990	2001
never	500 (6.0)	512 (8.6)
1 or 2 times a week	508 (5.8)	522 (8.5)
3 or more times a week	490 (5.1)	488 (6.4)

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1. Consistently in both 1990 and 2001, students who reported they read aloud 3 or more times a week had lower mean reading scores than students who read less regularly. *t*-values for 3 or more times a week compared with 1 or 2 times a week in 1990 was 3.03 and in 2001 was 3.41. Missing data for 3% of students in 1990 and 4% of students in 2001.

APPENDIX E: Reference Material for Chapter 5

Table E.1: Year 5 students' reports of doing written work after reading in 1990 and 2001

Frequency of doing written work after reading	1990		2001	
	Percentage of students	Mean reading score (s.e.)	Percentage of students	Mean reading score (s.e.)
never or hardly ever	27 (1.8)	520 (5.4)	20 (2.3) ▼	532 (8.7)
sometimes	38 (1.9)	488 (7.3)	33 (2.4)	506 (8.2)
mostly or always	35 (1.8)	495 (5.6)	46 (3.1) ▲	489 (9.2)

Key: ▲ The percentage for 2001 is significantly higher than the percentage for 1990.
▼ The percentage for 2001 is significantly lower than the percentage for 1990.

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.
Some results may appear inconsistent due to rounding.

Table E.2: Students' Perceptions of Reading Homework (SPRH) Index in 1990 and 2001

Level on the SPRH index	1990		2001	
	Percentage of students	Mean reading score (s.e.)	Percentage of students	Mean reading score (s.e.)
low	21 (1.5)	489 (9.3)	20 (2.8)	490 (8.8)
medium	61 (1.2)	493 (5.1)	60 (2.1)	496 (6.9)
high	18 (1.5)	526 (7.7)	19 (2.7)	517 (17.2)

Note: (s.e.) Standard errors are reported in parentheses. See Technical Note TN 2.1.
Some results may appear inconsistent due to rounding.
Adjusted percentages are shown. Missing data or responses inconsistent for up to 28% of students.

Technical Notes

These technical notes provide a summary of the information described in the *PIRLS 2001 Technical Report* (Martin, Mullis & Kennedy (Eds.), 2003) which contained details on the technical aspects of the Trends study along with those on PIRLS.

TN 1 Weighting and Scaling

The presentation of both national and international data in this report is underpinned by a range of data cleaning and analysis procedures conducted by the IEA Data Processing Centre (DPC), the PIRLS International Study Center (ISC), and Statistics Canada. The analysis procedures are governed by the test design, in terms of both sampling and instrumentation.

The sampling design required schools to be sampled with a probability proportion to size (PPS), and for classrooms to be sampled with equal probabilities. In addition, many countries, including New Zealand, used stratification to improve the precision of their sampling. Weighting was applied to all countries' data to ensure proper survey estimates and to adjust for the fact that the sampling design resulted in differential probabilities of selection for each student within the population.

In order to compare the 1990-1991 data with the 2001 data, they needed to be placed on the same scale. The 1990-1991 data was scaled at the time using a one-parameter IRT model known as the Rasch model. However, the two- and three- parameter models with conditioning and plausible values used in recent IEA studies were thought to be a better fit to the data and more suitable for detecting possibly small changes in scores over time. Thus the two- and three-parameter models were used to re-scale the 1990-1991 data and also to scale the 2001 data, placing them on the same scale.

TN 1.1 Weighting

The weighting took into account school, class, and student level sampling issues so that the overall sampling weight was a product of the school, class, and student weights. The school weight took into account stratification of the school, the size of the school since PPS sampling was used, and participation rates of sampled schools. The class weight took into account the number of classes in the selected school and the number of classes that participated in the study. The student weight took into account the number of students within the sampled class that participated, ignoring any excluded students. For further details see Joncas (2003).

TN 1.2 Item Response Theory (IRT) scaling and plausible values methodology

The IRT scaling approach and plausible values methodology that were used in other IEA studies such as PIRLS and TIMSS was also applied to the Trends data. This involved examining the results for items (calibrating) and examining the background characteristics of the students (conditioning – explained further below). From this, estimates of proficiency for each student and IRT scales for reporting student reading achievement were generated. Under this process, the scales and proficiency estimates were created for reading overall and for each of the three reading text types (narrative, expository, and document). Finally, the resulting values were placed on a reporting scale with a mean of 500 and a standard deviation of 100.

Calibration and conditioning

The calibration of assessment items involved two different models depending on the item type and scoring procedure. Each model describes the probability that a student will respond in a specific way to an item depending on the student's proficiency and characteristics (or parameters) of the item. The characteristics of the item include its discriminating power, difficulty and, in the case of multiple-choice items, the chances of respondents of very low proficiency choosing the correct answer. Two different models were required because of the two different types of items: multiple-choice, and constructed-response.

The plausible values methodology uses background variables of the students to generate scores. Principal components analysis was conducted to select background variables to use as conditioning variables for each country. Variables were selected to account for 90 percent of the variance in the background variables.

Generating plausible values

Students' responses to the items they were given, the item parameters estimated at the calibration stage, and the conditioning variables were used to generate estimates of student proficiency called plausible values. In order for the uncertainty associated with this estimation to be quantified, five estimates for reading proficiency were generated. In addition, five estimates were created for the each sub-scale: narrative, expository and document.

Reporting

In order for the achievement results to be more accessible, the values generated from the IRT scaling and plausible values methodology were transformed, so that the distribution of each scale over all students had a mean of 500 and a standard deviation of 100. The 2001 data was used to set the mean for the common scale and the 1990-1991 data was re-scaled relative to this common scale. For more information on the scaling and plausible values methodology see Gonzalez (2003).

TN 2 Reporting of student achievement

TN 2.1 Standard errors

As mentioned earlier, the Trends test design involved sampling students from the population. Sampling introduces some uncertainty into population estimates and so all reports of student proficiency in this report are accompanied by standard errors. These standard errors (annotated s.e. in tables) incorporate both the sampling variance – the uncertainty due to generalising from the sample to the population, and the imputation variance – the uncertainty due to inferring each student's proficiency from their performance on a subset of the items.

The jackknife repeated replication technique (JRR) is used to estimate the sampling variance. This technique constructs a number of pseudo-replicates of the sample and compares each of the pseudo-replicated samples with that of the original sample.

As mentioned in TN 1.2, each student's proficiency is estimated by calculating five plausible values. The variability among these plausible values is used as a measure of the imputation variance. For further details of the standard errors see Gonzalez and Kennedy (2003).

TN 2.2 Significance tests

Comparisons of means

For comparisons of means between groups that have not been sampled independently of each other, for example the means for boys and girls, the test statistic computed in this report was:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{se_{diff}} \quad (1)$$

where se_{diff} was calculated using a jack-knife procedure appropriate for correlated samples. It involves computing the average difference between the two groups (e.g. girls and boys) once for each of 75 replicate samples (i.e. error due to sampling) and five more times for each of the plausible values (imputation error). The program JACKREGP.SAS supplied with the database was used for computing this standard error of the difference between means. The resulting value t is compared in this report to the critical value of 1.96 to determine whether the difference is significant (i.e. a test of significance with 95% confidence).

If the means for two groups that were sampled independently are being compared, for example comparing the means for two countries, then the standard error of the difference is calculated as the square root of the sum of the squared standard errors of each mean:

$$se_{diff} = \sqrt{se_1^2 + se_2^2} \quad (2)$$

This formula for calculating the standard error of the difference can also be applied to compare the means for samples that were not independently sampled (e.g. comparing girls and boys) (see Gonzalez, 1997). However, from experiences using New Zealand data from TIMSS 1994-1995 and TIMSS 1998-1999, t may be slightly under-estimated which could result in an increased likelihood of making a Type II error (i.e. accepting the null hypothesis of *no difference*). For further details see Gonzalez and Foy (2000), and Gonzalez and Kennedy (2003).

With the use of plausible values for estimating achievement, it is possible to calculate the standard error of the difference between means (se_{diff}) for non-correlated groups using the differences between the plausible values (rather than the standard errors of the means of the plausible values shown in equation 2). Martin, Mullis, Gonzalez and Kennedy (2003) have used such a method in their report, most commonly to calculate the standard error of the difference between the mean achievement of students in 1990-1991 and their counterparts in 2001. Generally, the method used by Martin et al. is used in this report too; however, calculations using equation 2 give similar values and do not change any conclusions drawn about statistical significance. For the interested reader, the formula for calculating this version of the se_{diff} can be written as shown in equation 3.

$$se_{diff} = \sqrt{(se_{1pvi}^2 + se_{2pvi}^2) + \left(\frac{6}{5} \text{Var}(\bar{X}_{diffpv1}, \bar{X}_{diffpv2}, \bar{X}_{diffpv3}, \bar{X}_{diffpv4}, \bar{X}_{diffpv5})\right)} \quad (3)$$

where $\bar{X}_{diffpvi} = \bar{X}_{1pvi} - \bar{X}_{2pvi}$ and pvi represents plausible value i for each of the 5 plausible values for each of two non-correlated groups.

Use of the Bonferroni procedure

Unlike TIMSS, the significance tests reported in the Trends study have NOT been adjusted for multiple comparisons. Although adjustments such as the Bonferroni procedure guard against misinterpreting the outcome of multiple simultaneous significance tests, the results vary depending on the number of groups or countries included in the adjustment, leading to apparently conflicting results from comparisons using different numbers of groups.

TN 2.3 Treatment of missing data

Assessment data

One of the requirements of the Trends study was that the same data cleaning rules applied in the 1990-1991 study should be used in the 2001 study. With reference to missing data, all items following the last item containing a valid value were re-coded to *not reached*. To obtain raw scores, all correct answers were totalled for each student in each domain or text type.

Contextual data

For tables in this report, particularly those containing context data, unless a non-response option is reported in the table, data are adjusted so that students with missing values are excluded. In general, around one to three percent of students had missing values for each question. For questions where the proportion of students with missing values exceeded three percent the proportion is noted below the table.

TN 2.4 Minimum group size for reporting means

Martin, Mullis, Gonzalez, and Kennedy, (2003) do not report means for groups which represent less than three percent of the population. In this report, some estimates of means tabulated for subgroups around this three percent level are annotated and should be treated with caution. These estimates have been calculated using a relatively small sample and the level of uncertainty around each estimate is reflected in the size of the standard error.

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²³ Also known as the School sector report.