Australian Journal of Teacher Education

Volume 39 | Issue 7 Article 7

2014

Standards in Literacy and Numeracy: Contributing Factors

Linda Meeks
Macquarie University

Coral Kemp
Macquarie University

Jennifer Stephenson
Macquarie University

Recommended Citation

Meeks, L., Kemp, C., & Stephenson, J. (2014). Standards in Literacy and Numeracy: Contributing Factors. *Australian Journal of Teacher Education, 39*(7).
http://dx.doi.org/10.14221/ajte.2014v39n7.3

Standards in Literacy and Numeracy: Contributing Factors

Linda Meeks
Coral Kemp
Jennifer Stephenson
Macquarie University

Abstract: The establishment of international testing regimes such as the Progress in International Reading Literacy Study (PIRLS), the Trends in International Mathematics and Science Study (TIMSS), and the Programme for International Student Assessment (PISA) has provided one way for individual countries to monitor the effectiveness of their educational systems. In addition, student achievement may be compared with that of students from other participating countries. Studying the educational organisation of those countries and economies in which high-ranking results in international testing have been produced, including the roles played by teachers, students, and systems, provides valuable information for use in countries where there is a desire for improved student performance. In combination with the research literature, the main findings from such an investigation suggest that it is teachers who make the difference, and that it is the responsibility of governments and teacher training institutions to select and prepare teachers accordingly.

It has become increasingly clear over the last decade that education systems in a number of countries are failing to provide a learning environment that leads to success for many of their students (Auguste, Kihn, & Miller, 2010; Department of Education, Science and Training, 1997; Greenberg, McKee, & Walsh, 2013; Office for Standards in Education (Ofsted), 2011, 2012; Rowe, 2005; Thomson, 2008). In several member countries of the Organisation for Economic Cooperation and Development (OECD) low standards of literacy and numeracy are viewed as a serious problem in economic terms, especially when poor adult literacy requires a large financial commitment from governments, as well as from industry councils, in their drive to assist adults to attain basic literacy and numeracy skills (Baer, Kutner, & Sabatini, 2009; Industry Skills Council, 2011; Kingston, 2009; OECD, 2010b; Toppo, 2009). A recent survey of adult skills conducted as part of the Programme for the International Assessment of Adult Competencies (PIACC) (OECD, 2013c), found a close relationship between countries' performance in the Programme for International Student Assessment (PISA) and the literacy and numeracy proficiency of their students later in life. The result of having poor skills in literacy and numeracy often had a major impact on access to more desirable, and well-paid, employment opportunities (OECD, 2013b).

Every year, since 2008, Australian students in years 3, 5, 7, and 9 have taken part in the National Assessment Program – Literacy and Numeracy (NAPLAN). The results are used for a number of purposes: to give parents an indication of their child's school progress; to assist teachers and schools to provide programs that meet the needs of their students; and to enable school systems to evaluate and improve the services that they offer (Australian Curriculum, Assessment and Reporting Authority, 2011). Australian students also take part in international assessments of literacy and numeracy including the Progress in International Reading Literacy Study (PIRLS), through which the literacy skills of students in Grade 4 are assessed, and the Trends in International Mathematics and Science Study (TIMSS), through

which a range of mathematics skills of students in Grades 4 and 8 is assessed. They also participate in the Programme for International Student Assessment (PISA), which is used to evaluate education systems worldwide by assessing the competencies of 15-year olds in three key areas: reading, mathematics and science (OECD, 2009c). Based on the results of these assessment programs, reports in the Australian media continue to refer to falling standards in literacy and numeracy and the effect that this decline has on the students themselves, as well as the effect on adults in the workforce who are unable to develop their careers because of their low literacy skills (Bailey, 2010; Bonnor, 2010; Ferrari, 2012; Laurie, 2012; Maher, 2011; "Reading Decline", 2010; Rosenberg, 2012).

Regardless of whether or not the perception that standards in literacy and numeracy are falling can be substantiated, the results of national and international assessment regimes indicate that many students are entering secondary education without the skills needed to negotiate the curriculum at this level, and that students are still completing their secondary education without reaching functional levels of literacy and numeracy (Thomson, De Bortoli, Nicholas, Hillman, & Buckley, 2010). If standards are falling we need to consider the extent of this decline by comparing Australian data with international rates of student achievement. The extent and range of data resulting from the PISA process offers policy makers and educators, in any given country, the opportunity to compare the success or otherwise of their own policy decision-making against those of the world's most effective education systems. "Indeed, in a global economy, success is no longer measured against national standards alone, but against the best-performing and most rapidly improving education systems" (OECD, 2013a, p. 3).

The purpose of the current paper is to explore the factors that potentially influence the literacy and numeracy levels of students within the Australian context, with specific attention given to those students whose performance is weak. Levels of literacy and numeracy among young Australians will be examined and compared to two major English-speaking countries (the United Kingdom and the United States) and four of the top performing countries in PISA, PIRLS and TIMSS (Korea, Hong Kong (China), Shanghai (China), and Finland). The relationship between student achievement and factors such as teachers, students, and education systems, will be investigated by comparing countries and economies participating in international assessment programs. The implications for government intervention, following the identification of factors that (a) have the potential to influence standards, and (b) are amenable to change, will be briefly discussed.

International Assessments of Student Achievement

Concerns about a decline in literacy and numeracy standards are not new. In order to determine factors and interventions that may contribute to improved student achievement, it is important to consider student performance in an international context. The Progress in International Reading Literacy Study (PIRLS) assessment program, through which the literacy performance of students in Grade 4 is assessed, commenced in 2001 and has occurred subsequently every five years. Grade 4 is seen as an important point in children's development as readers, as it is at this age that most students make the transition from learning to read to reading to learn. PIRLS defines two major purposes of reading (literary experience and the acquisition of information), and four processes of comprehension (retrieval of explicit information; making inferences; integration of ideas and information; and evaluation of content) for Grade 4 students (Thomson et al., 2012). Of the forty-five countries that participated in PIRLS 2011, the four top-performing countries were Hong Kong (China), the Russian Federation, Finland, and Singapore. Australia ranked 27th in the

list of 45 countries, and was also ranked lower than all other English-speaking countries (Thomson et al., 2012). See Table 1 for details relating to average scale scores and rankings for the 2011 PIRLS (Korea and Shanghai (China) did not participate). As Australian students participated in PIRLS for the first time in 2011, it is not possible to use data from PIRLS to investigate any change in literacy performance of Australian primary school students.

Country	PIRLS Score 2011 (Rank out of 45 countries)
Finland	568 (3)
Hong Kong, China	571 (1)
United States	556 (6)
England	552 (11)
Australia	527 (27)
PIRLS Scale Centrepoint	500

Note. Data source – Mullis, Martin, Foy, & Drucker, 2012.

Table 1: PIRLS 2011 Grade 4 average scale scores and rankings for reading

The data provided in Table 2 show the total percentage of students reaching each PIRLS 2011 benchmark score. Although the scores for Australian students were generally at the international median, it is a concern that 7% of Australian students scored less than the low benchmark score, with the performance of 2% of students being too low for estimation.

The Trends in International Mathematics and Science Study (TIMSS) has been conducted at Grade 4 and Grade 8 on a four-year cycle since 1995. Australian students have participated in TIMSS since its inception. The TIMSS Grade 4 mathematics assessment covers: number (whole numbers, fractions and decimals, number sentences, patterns and relationships); geometric shapes and measurement (lines and angles, two- and three-dimensional shapes, location and movement); and data display (reading and interpreting, organising and representing) (Mullis, 2012). Of the 50 countries that participated in TIMSS in 2011, the four top-performing countries were Korea, Hong Kong (China) Singapore, and Chinese Taipei. Australia ranked 19th in the list of 50 countries, lower than all other English-speaking countries apart from New Zealand. Across the years for which data are available, there does not appear to be a substantial change in either mean scores or ranking for Australian students. See Table 3 for details relating to TIMSS mean student scores and rankings.

The data provided in Table 4 show the total percentage of Grade 4 students reaching benchmark scores for mathematics in 2011. The scores for Australian students were above the international median at Advanced, High, and Intermediate benchmark levels. However, 10% of Australian students scored less than the Low benchmark, with 3% of these students having results too low for estimation (Mullis et al., 2012). This compares with 0%, 1%, 2%, and 4% respectively for Korea, Hong Kong (China), Finland and the United States for scores less than the Low benchmark, with only two of those countries (Finland and the United States) having any students (1% for each country) too low for estimation.

Country		Advanced	High	Intermediate	Low	Less than Low	Too Low for
		625	550	475	400		Estimation
	Ranking	Percentage of Students at Benchmark and Above				Percentage of Students at Benchmark	
Finland	4	18	63	92	99	1	0
Hong Kong, China	6	18	67	93	99	1	0
United States	7	17	56	86	98	2	1
England	5	18	54	83	95	5	2
Australia	17	10	42	76	93	7	2
International Median		8	44	80	95	5	

Note. Data source – Mullis et al., 2012.

Table 2: PIRLS 2011 Performance at the international benchmarks of reading achievement 4th Grade (*N*=45)

Country	TIMSS Score 2011 (Rank out of 50)	TIMSS 2007 (Rank out of 36)	TIMSS 2003 (Rank out of 25)	TIMSS 1995 (Rank out of 26)
Finland	545 (8)			
Hong Kong, China	602 (3)	607 (1)	575 (2)	587 (4)
Korea	605 (2)			611 (2)
United States	541 (11)	529 (11)	518 (12)	545 (7)
England	542 (9)	541 (7)	531 (10)	513 (10)
Australia	516 (19)	516 (14)	499 (16)	546 (11)

Note. Data sources –Mullis et al., 1998; Mullis, Martin, Gonzalez, & Chrostowski, 2004; Mullis et al., 2008; Mullis et al., 2012. Blank cells indicate that no data are available for that year. TIMSS was not carried out for Grade 4 students in 1999.

Table 3: TIMSS 2011Grade 4 average scale scores and rankings for mathematics

Country		Advanced 625	High 550	Intermediate 475	Low 400	Less than Low	Too Low for Estimation
	Ranking	Percentage of Students at Benchmark and Above				Percentage of Students at Benchmark	
Finland	10	12	49	85	98	2	1
Hong Kong, China	3	37	80	96	99	1	0
Korea	2	39	80	97	100	0	0
United States	9	13	47	81	96	4	1
England	7	18	49	78	93	7	2
Australia	13	10	35	70	90	10	3
International Median		4	28	69	90		

Note. Data source – Mullis et al., 2012.

Table 4: TIMSS 2011 Performance at the international benchmarks of mathematics achievement 4th Grade (*N*=50)

Topics included in the TIMSS Grade 8 mathematics assessment were number (whole numbers, fractions and decimals, integers, patterns and ratio, proportion, and percentage); algebra (patterns, algebraic expressions, equations/formulas and functions); geometry (geometric shapes, geometric measurement, location and movement); and data and chance (data organisation and representation, data interpretation, chance) (Mullis, 2008). Forty-two countries participated in TIMSS (Grade 8) in 2011. The three top-performing countries were Korea, Singapore, and Chinese Taipei, with Australia ranking 12th. Australia's average student scores and ranking do not appear to have changed substantially over the assessment periods. TIMSS data for Grade 8 students are presented in Table 5.

Country	TIMSS Score 2011 (Rank out of 42)	TIMSS 2007 (Rank out of 49)	TIMSS 2003 (Rank out of 45)	TIMSS 1999 (Rank out of 38)	TIMSS 1995 (Rank out of 25*)
Finland	514 (8)			520 (14)	
Hong Kong, China	586 (4)	572 (4)	586 (3)	582 (4)	588 (4)
Korea	613 (1)	597 (2)	589 (2)	587 (2)	607 (2)
United States	509 (9)	508 (9)	504 (15)	502 (19)	500 (18)
England	507 (10)	513 (7)	498	496 (20)	506 (16)
Australia	505 (12)	496 (14)	505 (14)	525 (13)	

Note. Data sources – Mullis et al.,1998; Mullis et al., 2000; Mullis et al., 2004; Mullis et al., 2008; Mullis et al., 2012; http://nces.ed.gov/timss/results99_1.asp. Blank cells indicate that no data are available for that year. *41 countries participated in TIMSS 1995 at 8th Grade. 16 countries did not satisfy guidelines. Ranking is based on the 25 countries that did satisfy guidelines.

Table 5: TIMSS 2011 Grade 8 average student scores and rankings for mathematics

The data in Table 6 show the total percentage of Grade 8 students reaching benchmark scores for mathematics. The scores for Australian students were well above the international median at Advanced, High, and Intermediate benchmark levels. However, 11% of Australian students scored less than the Low benchmark, with 4% of these students having results too low for estimation (Mullis et al., 2012). This compares with 1%, 3%, 4% and 8% respectively for students scoring less than the Low benchmark in Korea, Hong Kong (China), Finland and the United States, with 1%, 2%, 2%, and 3% respectively of student scores too low to be estimated.

The Programme for International Student Assessment (PISA), was officially launched in 1997, with the first survey taking place in 2000 and then subsequently every three years. One function of the surveys is to determine to what extent students at the end of compulsory education can apply their knowledge to real-life situations and are equipped for full participation in society (OECD, 2009b). By measuring the content knowledge and skills of 15-year-old students in the areas of reading, mathematics, and science literacy, the tests also provide an insight into the "quality, equity and efficiency of school systems" throughout the world (OECD, 2011a, p. 84.

Country		Advanced 625	High 550	Intermediate 475	Low 400	Less than Low	Too Low for Estimation
	Ranking	Percentage of Students at Benchmark and Above				Percentage of Students at Benchmark	
Finland	18	4	30	73	96	4	2
Hong Kong, China	4	34	71	89	97	3	2
Korea	3	47	77	93	99	1	1
United States	12	7	30	68	92	8	3
England	19	8	32	65	88	12	4
Australia	8	9	29	63	89	11	4
International Median		3	17	46	75		

Note. Data source – Mullis et al., 2012.

Table 6: TIMSS 2011 Performance at the international benchmarks of mathematics achievement 8th Grade (*N*=42)

PISA is designed to assess content knowledge and the ability to analyse problems, seek solutions, and communicate ideas. Students are required to answer a background questionnaire, providing information about themselves and their homes. School principals are asked to complete a questionnaire about their schools. One of the important responsibilities of PISA is to ensure that the instruments used in all participating countries to assess their students' reading, mathematical and scientific literacy provide reliable and fully comparable information. To this end, a set of specific descriptive scales has been developed for each subject area. The scales are divided into six levels that represent groups of PISA test questions, beginning at Level 1 and increasing in difficulty with each level. For example, a reading unit task may require students to answer five questions. Each question is given a level of difficulty indicated by a score point (OECD, 2009d, p. 17-18, 58-59). In each test subject, the score for each participating country is the average of all student scores in that country. The average score among OECD countries is 500 points (*SD*,100) with about two-thirds of students scoring between 400 and 600 points (OECD, 2011a). PISA gives a score for each subject area and countries are ranked by their mean score in each area (OECD, 2009b).

Table 7 provides the mean student scores and 2012, 2009, 2006, 2003, and 2000 rankings for reading and mathematics for the countries selected for comparison in this paper. Although Finland has generally been considered the top performer in PISA since its inception in 2000, closely followed by Korea, Shanghai, China has been ranked highest for both reading and mathematics since it joined the program in 2009.

An inspection of Australia's PISA ranking over time would suggest that, although the reading and mathematics scores for Australian students are both still above the OECD average (see Tab. 7), the performance of Australian students is declining. However, the number of countries participating in PISA has risen by 33 countries between 2000 and 2012 and this factor may partly account for Australia's lower rankings. As with the PIRLS and TIMSS data, therefore, it is likely to be more useful to identify the percentage of Australian students falling into the bottom performance levels (Levels 1 and 2) in reading and mathematics (see Tab. 8 and 9).

	2012		2009		2006		2003		2000	
	Number of Participating Countries and Economies									
	65		65		57		41		31	
	Reading	Maths	Reading	Maths	Reading	Maths	Reading	Maths	Reading	Maths
Finland	524 (6)	519 (12)	536 (3)	541 (2)	547 (2)	548 (2)	543 (1)	544 (2)	546 (1)	536 (4)
Hong Kong China	570 (2)	561 (3)	533 (4)	555 (4)	536 (3)	547 (3)	510 (10)	550 (1)		
Korea	536 (5)	554 (5)	539 (2)	546 (3)	556 (1)	547 (4)	534 (2)	542 (3)	525 (6)	547 (2)
Shanghai China	570 (1)	613 (1)	556 (1)	600 (1)						
United States	498 (24)	481 (36)	500 (24)	487 (32)		474 (35)	495 (18)	483 (28)	504 (15)	493 (19)
United Kingdom	499 (23)	494 (26)	494 (27)	492 (21)	495 (17)	495 (24)			523 (7)	529 (8)
Australia	512 (13)	504 (19)	515 (9)	514 (15)	513 (7)	520 (13)	525 (4)	524 (11)	528 (4)	533 (5)
OECD Average	496	494	493	496	492		494	500	500	500

Note. Data sources – Micklewright & Schnepf, 2006, OECD 2004, 2007, 2010a, 2011a, 2013a, Thomson et al., 2010. Blank cells indicate that no data are available for that year. Rankings are based on the mean scores of students on the PISA reading and mathematics assessments. Rankings are in parenthesis. The PIRLS and TIMSS programs provide data for England, the PISA program provides data for the United Kingdom.

Table 7: Mean Student Scores and PISA Rankings for Reading and Mathematics

	2012	2009	2006	2003	2000
Level 6	1.9	2.1	0	0	0
Level 5	9.8	10.7	10.6	14.6	17.6
Level 4	23.3	24.1	24.9	26.9	25.3
Level 3	29.1	28.5	30.1	28.4	25.7
Level 2	21.6	20.4	21	18.3	19
Level 1 or below	14.2	14.3	13.4	11.8	12.4
Total below Level 3	35.8	34.7	34.4	30.1	31.4

Note. Data sources – OECD 2001; 2003b; 2004; 2007; 2010d; 2013a.

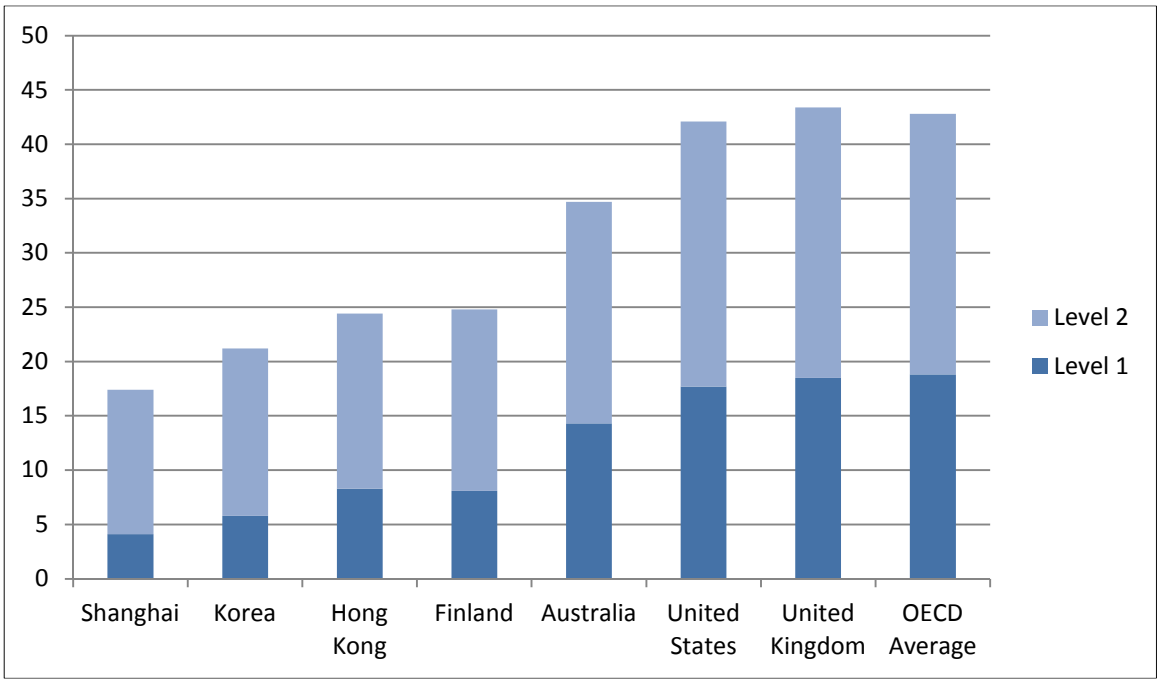
Table 8: Percentage of Australian Students at Each Proficiency Level in PISA Reading Assessments 2000-2012

	2012	2009	2006	2003
Level 6	4.3	4.5	4.3	5.8
Level 5	10.5	11.9	12.1	14
Level 4	19	21.7	23.2	23.3
Level 3	24.6	25.8	26.9	24
Level 2	21.9	20.3	20.5	18.6
Level 1 or below	19.6	15.9	13	14.3
Total below Level 3	41.5	36.2	33.5	32.9

Note. Data sources – OECD 2003b; 2004; 2007; 2010d; 2013a.

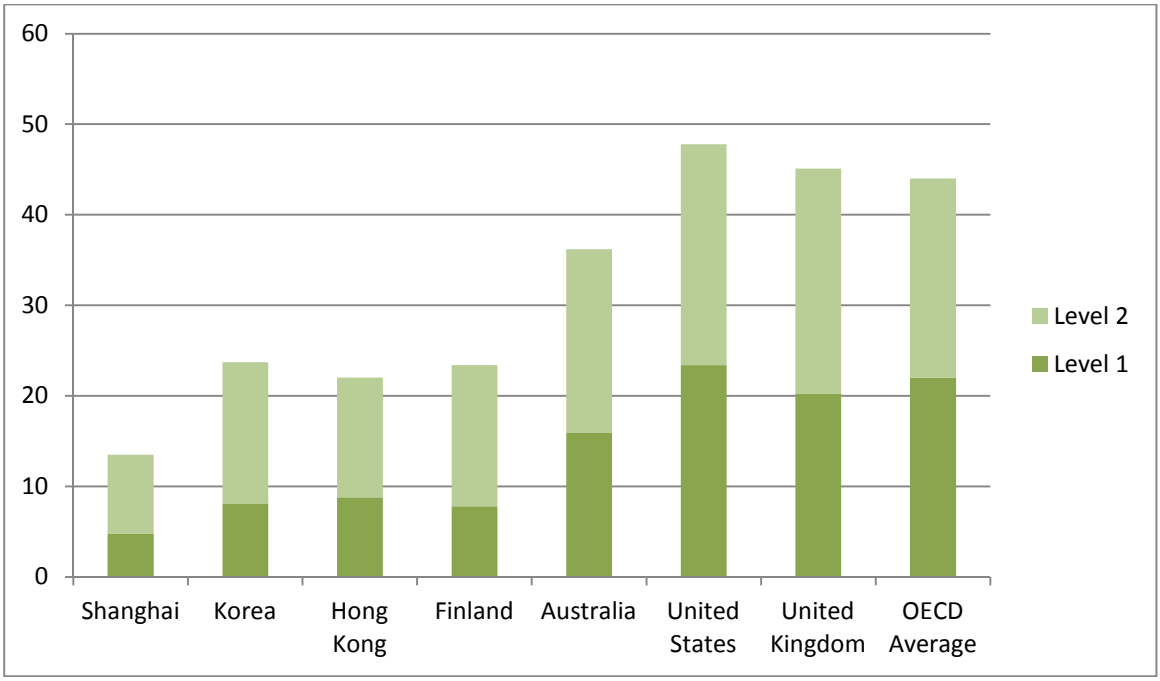
Table 9: Percentage of Australian Students at Each Proficiency Level in PISA Mathematics Assessments 2003-2012

In the PISA studies, reading literacy is defined as being able to understand, use, and reflect on written texts, and mathematical literacy is concerned with an individual's capacity to identify and understand the role that mathematics plays in the world (OECD, 2009b). For both domains, Level 2 is considered a minimum standard of proficiency, at which students begin to demonstrate the skills that will enable them to participate effectively and productively in life (OECD, 2009c). Using the 2009 data (Figs. 1 and 2) it is possible to compare the proportion of students demonstrating minimal competency in reading and mathematics across the seven PISA participating countries included in this paper. Although all countries compare favourably with the OECD average, it is quite clear that there is a wide range in the percentage of students operating at a minimum, and below minimum, level. Nearly 45% of students in the United States and the United Kingdom score in the lowest levels (1 and 2); approximately 35% of Australian students score at this level; whilst less than 25% of students in Finland, Hong Kong (China), Korea, and Shanghai perform at levels 1 and 2. A comparison of lower performing students across the countries of interest for 2012 (see Figs. 3 and 4) tells a similar story.



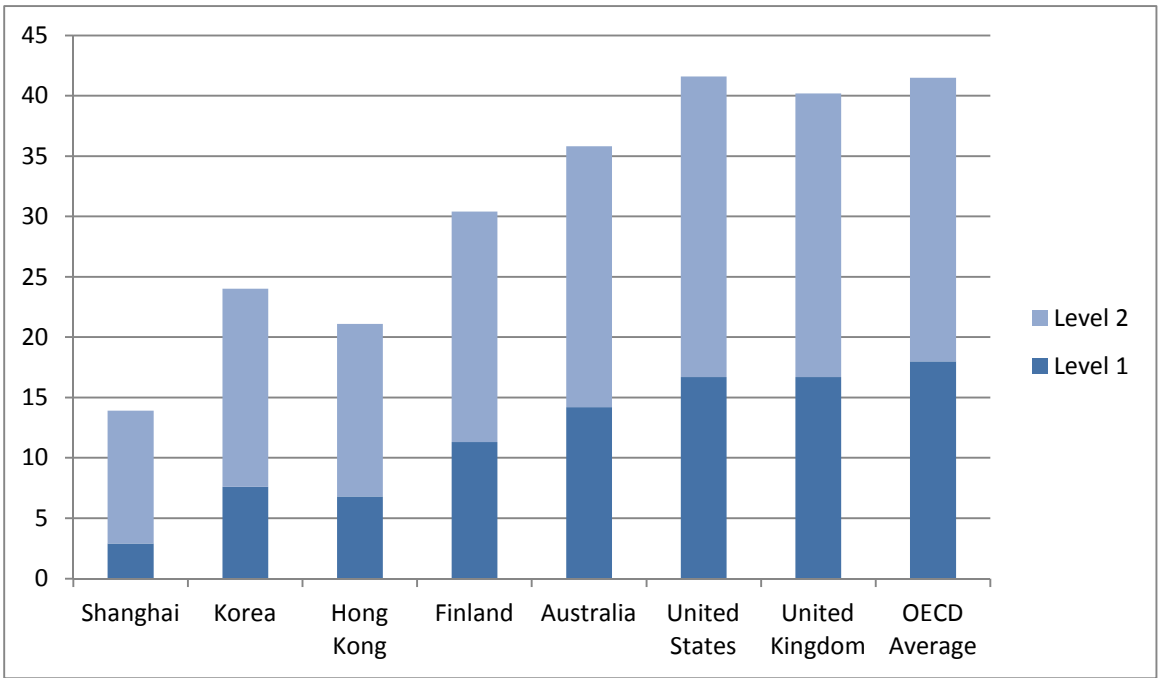
Note. Data sources – OECD 2010b.

Figure 1: Percentage of Students at Lowest Proficiency Levels 1 and 2 in PISA Reading Assessment 2009



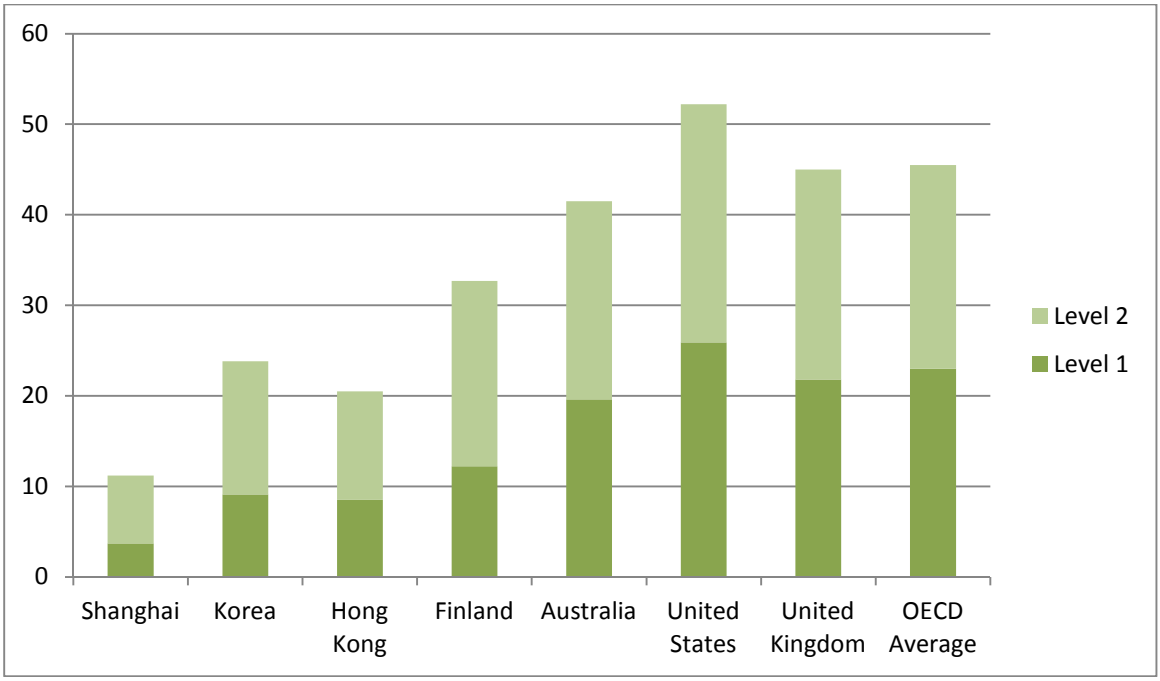
Note. Data sources – OECD 2010b.

Figure 2: Percentage of Students at Lowest Proficiency Levels 1 and 2 in PISA Mathematics Assessment 2009



Note. Data sources – OECD 2013a.

Figure 3: Percentage of Students at Lowest Proficiency Levels 1 and 2 in PISA Reading Assessment 2012



Note. Data sources – OECD 2013a.

Figure 4: Percentage of Students at Lowest Proficiency Levels 1 and 2 in PISA Mathematics Assessment 2012

It should be noted here that PISA Level 3 is identified in *Australia's Measurement Framework for Schooling* (ACARA, 2012, p. 5) as the proficient standard for reading, mathematics and science. Proficient standards represent a "challenging but reasonable expectation of student achievement at a year level with students needing to demonstrate more than elementary skills expected at that year level" (ACARA, 2012, p. 5). The data contained in Tables 8 and 9 indicate that more than 30% of Australian students do not reach the proficient standards for reading and mathematics as designated by ACARA, and that this percentage is increasing over time.

In order to determine the factors that contribute to the comparatively larger percentage of Australian students included at the minimal or low performing levels in PISA, PIRLS, and TIMSS, consideration should be given to those factors that potentially influence student literacy and numeracy achievement.

Potential Influences on Student Achievement

Over the last two decades a range of factors that may contribute to student academic success has been researched. These factors may be grouped into three general categories: national educational systems, teacher quality, and student attributes (including the home environment). On a national level, financial investment in education (including teacher salaries) and school organisation (including educational leadership, curricula, allocated instructional time, class size, and assessment programs) have been investigated (Biddle & Berliner, 2002; Hattie, 2009; OECD, 2012). Research topics concerning teacher quality include the selection of undergraduates for teaching programs, the quality and content of pre-service and in-service education courses, teaching approaches, and the provision of induction and mentoring programs (Darling-Hammond, 2000; Hattie, 2009; Ingersoll & Stronge, 2011; Langdon, 2011; Leigh & Ryan, 2008; Rowe, 2003; Stronge, Ward, & Grant, 2011).

Investigations into the impact of student dispositions and home environment on student achievement include prior academic success, motivation, and physical influences, as well as socio-economic status, parental involvement, parental background and education, and out of school coaching (CIEB, n.d.d.; Hattie, 2009; OECD, 2011b; OECD, 2012).

National Educational System Factors

Investment in Education

The national monetary investment in education of any country may be compared in two ways: the annual expenditure per school student and the percentage of a nation's Gross Domestic Product (GDP) spent on various levels of education. It would appear that two of the top performing countries in PISA, PIRLS and TIMSS (Finland and Korea) spend less per capita on education than Australia and the United States (See Tab. 10). Also, when comparing the percentage of GDP spent on schooling, Finland allocates the least amount and Hong Kong (China) allocates the most; this would suggest that, although a minimum investment might be required, student achievement is not necessarily dependent on financial investment.

	Percentage of GDP (Spent on Primary and Lower Secondary Institutions, 2009)	Annual Expenditure per Primary Student, 2009	Annual Expenditure per Secondary Student, 2009	Percentage of Students Achieving Levels 1 and 2 Reading Assessment, 2009
Finland	2.5	7,368	8,947	24.8
Hong Kong, China	3.5			24.4
Korea	3.1	6,658	9,399	21.2
Shanghai, China				17.4
United States	3.2	11,109	12,550	42.1
United Kingdom	3.0	9,088	10,013	43.4
Australia	3.3	8,328	10,137	34.7
OECD Average	2.6	7,719	9,312	42.8

Note. Data sources – OECD 2001, 2009c, 2010d, 2011a, 2012; http://www.inca.org.uk; http://www.eacea.ec.europa.eu/education; http://www.education.gov.uk. Blank cells indicate that no data are available for that year. Equivalent USD converted using PPPs. http://www.edb.gov.hk/en/about-edb/publications-stat/figures/gov-expenditure.html 2006/7

Table 10: System Factors: Cost of Schooling and Percentage of Students Achieving Levels 1 and 2 in the 2009 PISA Reading Assessment

Teacher salary

A comparison of the 2005 salaries of physicians, engineers, accountants, nurses, and teachers in Finland, Hong Kong (China), Korea, Shanghai (China), the United States, the United Kingdom, and Australia showed that, generally, physicians and engineers are best paid, nurses earn the least, and teacher salaries fit in the middle of the range

(www.worldsalaries.org). When comparing teacher salaries across these same countries, high student achievement does not appear to be related to high teacher salaries: in 2005 beginning teachers in the United States earned the highest salary whereas beginning teachers in Korea were paid the lowest salary.

Curriculum

A national curriculum is provided in Finland, Korea, Shanghai (China), Hong Kong (China), and the United Kingdom (OECD, 2010c). In the United States, most states follow a common core curriculum; however, a national curriculum is not provided (OECD, 2010c). The Australian Curriculum Assessment and Reporting Authority (ACARA) recently developed a National Australian Curriculum for implementation in 2013 (http://www.australiancurriculum.edu.au/). Independence in the application of national curriculums is varied: in Finland, the government allows teachers, schools, and municipalities the freedom to determine the content of teaching programs and the manner in which programs will be taught (OECD, 2010c); school superintendents in Korea have the autonomy to add content and standards to address the needs of their schools (CIEB, n.d.c; www.english.mest.go.kr); the United Kingdom government gives schools and teachers choice in the application of the national curriculum; and in Australia the extent of school autonomy is varied across States and Territories, as well as across State, Catholic, and independent systems (Australian Productivity Commission, 2012). As the provision of a national curriculum and the amount of autonomy that teachers and schools enjoy in the implementation process vary across all systems considered in this paper, it is not possible to determine whether either factor is associated with student achievement.

Assessment programs

National assessment programs generally take two forms: (a) a monitoring system that tracks student progress at regular intervals; and (b) an end-of-compulsory-schooling assessment, which is often used to determine entry into tertiary study and/or employment. Formative national assessments are conducted in Korea (OECD, 2011a), Shanghai, Hong Kong, the United States, the United Kingdom, and Australia (OECD, 2010c), and on a sample of students in Finland (OECD, 2010c). End of secondary schooling examinations are held in Finland, Shanghai, Korea, Hong Kong, the United States, the United Kingdom, and Australia. Does a national assessment program influence student achievement? All of the countries included for discussion in this paper have both formative and summative national assessment programs. A comparison of the number of students in PISA Bands 1 and 2 for reading literacy and mathematics literacy and those in the Low benchmark and below categories for PIRLS and TIMSS for each country provides no evidence that the use of national assessments influences student achievement.

Minimum academic requirements for teachers

Across the countries included for discussion, the range of minimum academic requirements for entry into teaching is wide. All teachers in Finland must hold a master's degree. Teachers in Korea, the United States and the United Kingdom must hold a bachelor's degree and either a graduate diploma in education, or a master's degree. In Australia, teachers must have either a bachelor's degree in education, a bachelor's degree and a

postgraduate qualification in education, or a master's degree. In Hong Kong (China), primary teachers should hold an associate degree, and in Shanghai (China), primary school teachers are required to have a diploma (Center of International Educational Benchmarking, n.d.b., n.d.d., n.d.e., n.d.f.; OECD, 2011c; pearsonfoundationorg/oecd/china.html; www.education.gov.uk/publications). It appears, therefore, that level of minimum academic requirement for employment in the teaching profession does not make a critical contribution to student achievement.

Compulsory instructional time prior to the PISA assessments

Countries usually have statutory or regulatory requirements regarding hours of instruction. These are most often stipulated as the minimum number of hours of instruction a school must offer (OECD, 2008). The number of hours of instruction is generally divided into two categories: (a) total intended instruction time (which includes both compulsory and non-compulsory curriculum content); and (b) total compulsory instruction time (the estimated number of hours during which students are taught both the compulsory core curriculum and flexible parts of the compulsory curriculum) (OECD, 2011c). Between the ages of 7 and 15, Finnish students will have received 6323 hours of compulsory instruction, Korean students will have received 6930 hours and Australian students will have received 8889 hours (see Tab. 9) (OECD, 2012). A comparison of the percentage of students with PISA reading scores below level 2 (see Fig. 1) shows that students in Finland received the least number of compulsory instructional hours between the ages of 7 and 15, commenced formal school at age 6, and had an average total of 7% of students below Level 2 in the reading literacy scales. In Australia, students received the greatest number of compulsory instructional hours between the ages of 7 and 15, commenced formal schooling a year earlier than Finnish students, at age 5, and had 14.3% of students below Level 2 in the reading literacy scales (See Tab. 11). Whilst it would appear that fewer instructional hours are related to better student results, the data do not provide information regarding the number of hours of literacy instruction included in this total, nor the effectiveness of the instruction. There is no evidence, therefore, to indicate that the number of compulsory instructional hours accounts for variations in student achievement.

	Age range at which over 90% of the population are enrolled	Ages 7-8	Ages 9-11	Ages 12-14	Age 15	Total Ages 7-15
Finland	6-18	1216	1920	2331	856	6323
Korea	6-17	1224	2109	2577	1020	6930
England	4-16	1786	2697	2775	950	8208
Australia	5-16	1964	2952	2991	982	8889
OECD Average	4-16	1584	2463	2697	920	7628

Note. Data source – OECD 2012, p.435. Data is not provided for average number of hours per year of total compulsory instruction time before the age of 7 for any of the countries included in this table.

Table 11: Age Range at which over 90% of the Population are Enrolled and Total Compulsory Instruction Time between the Ages of 7-8, 9-11, 12-14 and 15 years

Class size

A recurrent theme in the literature has been the effect of class size on student achievement, suggesting that smaller class sizes lead to continued improvement over time in student performance (Biddle & Berliner, 2002; Mosteller, 1995; Nye, Hedges, & Konstanopoulos, 1999). Recent research has suggested that smaller class sizes make a small contribution to increased student achievement, but that the financial investment could be better used elsewhere (Altinok & Kingdon, 2012; Chingos, 2012; Department for Education [UK] n.d.; Galton & Pell, 2012; Hanushek, 2000; Hattie, 2005; Konstantopoulos, 2011; Stanford, 2011). The average lower secondary class sizes for five of the seven countries compared in this paper range from 19.6 to 35.1 students, with average student-teacher ratios ranging from 9.9:1 to 20.5:1. Comparing class size with the PISA ranking for reading literacy, across countries of interest in 2009, would indicate that there is not a strong relationship between these variables (see Tabs. 12 and 13). It should also be noted that Korea, which was one of the top ranking countries for TIMSS (ranked 1 for Grade 8 and 2 for Grade 4 in 2011), had the largest average class size across the countries included for both primary and lower secondary in 2010.

	Finland	Korea	United States	United Kingdom	Australia	OECD Average
Average Class Size	19.4	27.5	20	24.4	23.7	21.2
Student-Teacher Ratio	14	21.1	14.5	19.8	15.7	15.9
2009 Reading Rank	3	2	24	27	9	

Note. Data source – OECD 2011c, 2012.

Table 12: Average Primary School Class Size, Student-Teacher Ratio (2010) and 2009 PISA Reading Rank

	Finland	Korea	United States	United Kingdom	Australia	OECD Average
Average Class Size	20.3	34.7	23.2	19.4	23.7	23.4
Student-Teacher Ratio	9.8	19.7	14	17.1		15.9
2009 Reading Rank	3	2	24	27	9	

Note. Data source – OECD 2011c, 2012. Blank cells indicate that no data are available for that year.

Table 13: Average Lower Secondary School Class Size, Student-Teacher Ratio (2010) and 2009 PISA Reading Rank

Teacher Factors

Research has consistently linked teacher quality to student achievement (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2009; Darling-Hammond, 2000; Hayes, Noonan, & Heldsinger, 2010; McColskey et al., 2005; Rockoff, 2003; Rowe, 2003; Rubie-Davies, Hattie,

& Hamilton, 2006; Stronge et al., 2008; Stronge et al., 2011). Measures of teacher quality have included subject-matter knowledge, evidence-based pedagogical skills (Ingvarson & Rowe, 2007), teacher preparation, and qualifications (Darling-Hammond, 2000). Factors that have the potential to influence teacher quality include the ability of the students entering teacher preparation programs and teacher status. These factors are interrelated in that the status of the teaching profession is likely to influence the choice of teaching as a career and the quality of the teaching force is likely to affect the status of teaching as a profession. The quality of teacher preparation programs might also have an impact on the quality of classroom teaching, as might support for beginning teachers, ongoing professional development, and the retention of more able teachers.

Choice of undergraduates for teaching programs

It could be argued that social status of teachers within a community could be reflected in the career choices made by school leavers. Student results in PISA have shown higher student achievement in those countries where teaching is a preferred career choice. For example, in 2010 in Finland over 6,600 applicants applied for 660 primary school teacher training places (OECD, 2010c) even though the application and selection procedures were onerous: academic performance at matriculation; a written assessment; performance in practical teaching activities; and interviews (OECD, 2003a). Similarly, in Korea, only an estimated 5% of applicants are accepted into undergraduate degrees in primary education (Center on International Education Benchmarking (CIEB), n.d.c.). Entry into undergraduate teacher training programs in Australia, on the other hand, is less selective and shows a decline in the prior education achievement of applicants since 1980 (Australian Productivity Commission, 2012; Crowley, 1998; Leigh & Ryan, 2008). The 2013 Australian Institute for Teaching and School Leadership report indicates that the majority of school leavers entering teacher training programs have an Australian Tertiary Admission Rank (ATAR) of between 61 and 80 (ATAR range 30 - 99.95) (Mackay, 2013). If all undergraduate teachers receive high quality teacher education programs, higher standards for entry should result in more competent teachers.

In 2003, Rod Paige, the U.S. Secretary of Education, stated that "teachers' general cognitive ability is the attribute studied in the literature that is most strongly correlated with effectiveness" (U.S. Department of Education, p. 2). If less able students choose to train as teachers the impact on student performance in schools may well be significant. A comparison of the percentage of students performing at Level 1 in the 2009 PISA reading and mathematics literacy assessments (see Figs. 1 and 2) and at the Low benchmark in the 2011 PIRLS and TIMSS for Finland, Korea, and Australia would appear to support this view.

Teacher Preparation

Because it is beyond the scope of this paper to provide an in-depth evaluation of teacher preparation programs across countries participating in international assessments, it is not possible to determine the contribution of initial teacher training over and above the contribution of the quality of undergraduates accepted into teacher education programs. However, as important as it is to recruit able school leavers into teacher education, the content of tertiary programs offered to teacher trainees requires some scrutiny. Although examination of the content of pre-service teacher training has increased over the last decade (Carter, H., Amrein-Beardsley, & Hansen, 2011; Coalition for Psychology in Schools and

Education, 2006; Dyson, 2005; Ingvarson et al., 2004; Kwong Lee Dow, 2003; Levine, A., 2006; Liston, Whitcomb, & Borko, 2006; Louden et al., 2004; Louden et al., 2005; Murray, Nuttall, & Mitchell, 2008; Rohl & Greaves, 2004; Wilson et al., 2001), there still appears to be a lack of consensus of what constitutes quality teacher preparation. Generally, teachers combine two sets of knowledge: subject content knowledge and the practice of teaching (pedagogy) (Boe, Shin, & Cook, 2007; Gore et al., 2007; Hassan, Khaled, & Kaabi, 2010; Ingvarson et al., 2004; Kosnick & Beck, 2008; Wilson, Floden, & Ferrini-Mundy, 2001). However, there is a growing concern that pre-service teacher education does not provide novice teachers with the skills and knowledge necessary to be effective in the classroom (Greenberg et al., 2013; Rohl & Greaves, 2004; Wilson et al., 2001). In fact, Levine (2006) recommended that educational faculties needed to be transformed from ivory towers into professional schools focused on classroom practice. Walsh (2006) claimed that "the nation's leading teacher educators ... concede that there is presently very little empirical evidence to support the methods used to prepare the nation's teachers" (p. 1). It could be argued, therefore, that potential deficiencies in teacher preparation may have resulted, in part, from a disregard for evidence-based practices in favour of "beliefs, anecdotes, testimonials and ... expert opinions" (Carter, M. and Wheldall, 2008, p. 7).

Supporting teachers once they are in the system

Retaining quality teachers, besides being a financial imperative, is thought to be critical for improving student outcomes (Council of Australian Governments [COAG], 2009; Manuel, 2003; Plunkett & Dyson, 2011). In the United States, Ingersoll and Smith (2004) estimated that up to 50% of beginning teachers leave the profession in their first five years, and in the United Kingdom 30 - 50% of teachers leave within the first three to five years (Cooper & Alvarado, 2006). By comparison, the attrition rates for Korea are estimated to be 1% per annum, in Finland 10% per annum, and in Hong Kong (China) between 3.9% and 9.3%. Attrition rates in the first five years of teaching for Australian teachers have been estimated at between 20% and 25% (CIEB, n.d.a.; Kearney, 2011; Ramsey, 2000). However, data for the last five years in the state of New South Wales suggest the attrition rate for early career teachers is about 10% (NSW Government, n.d.).

In order to reduce the exit rate of teachers from the workforce, some countries (England and Wales, France, Greece, Israel, Italy, Japan, Korea, Northern Ireland, and Switzerland) have established formal induction programs that include additional training, mentoring by an experienced teacher, and classroom observations (Sclafani, 2011). In conjunction with this early support, a few countries also provide specific professional development programs that are designed to meet individual teacher needs. A study by Rockoff (2008), however, in which the relationship between a mentoring program and teacher attrition rates was measured, found only weak effects on teacher absences and retention. A white paper produced by the Friday Institute for Educational Innovation also suggested that a single initiative, such as a mentoring program, will not affect attrition rates and recommended a set of initiatives, including a comprehensive induction program and an increase in teacher salary, as the basis for retaining teachers in the classroom (Corbell, 2009).

It should be noted that attrition is inevitable within any profession or industry, and a low level of teacher attrition does not necessarily mean that all is well. In fact, levels of attrition could be seen as positive or negative depending on which teachers are staying and which teachers are leaving. It is also important to consider the factors that may influence teacher decisions to stay, or to leave, the profession (Henry, Bastian, & Fortner, 2011;

OECD, 2005a). At this point in time, it appears that there is no evidence either way to link teacher attrition with student performance.

In-class support, induction and mentoring

Following graduation, new teachers add to their basic pre-service training in a number of ways: in-class support in the form of observations and appraisals (of the novice teacher) with feedback, school induction programs, mentoring systems, and opportunities for novice teachers to observe experienced teachers operating in the classroom (Langdon, 2011). In his meta-analysis of effects on student achievement, Hattie found that the most effective method of influencing teacher knowledge and behaviour to be through the provision of feedback to teachers about what is happening in their classrooms. Observations and feedback concerning actual classroom teaching and the use of formative evaluation of student performance were found to have positive impact on the quality of teaching (2009). In 2008, 23 countries participated in the first cycle of the OECD's Teaching and Learning International Survey (TALIS), focusing on lower secondary education teachers. In the report that followed, appraisal and feedback were seen as important forms of support for novice teachers. The study found that more than 19% of new teachers surveyed had never received appraisal and feedback on their teaching, with a range of 5% in Belgium to over 32% in Spain. Only 7.3% of Australian teachers reported having never received such support (Jensen et al., 2012).

Ingersoll and Stronge (2011) reviewed 15 studies on induction and mentoring programs for beginning teachers. Four of these studies examined the relationship between beginning teachers' participation in induction and the academic achievement of their students. These authors acknowledged that all of the studies reviewed had limitations and weaknesses of one sort or another. However, the evidence generally supported the suggestion that students taught by beginning teachers who had participated in some kind of induction program had higher scores, or gains, on academic achievement tests.

Of the countries included for comparison, the United Kingdom is the only one that provides mandatory teacher induction programs, for a specified amount of time, as well as a reduced workload in the first year of teaching. By comparison, teachers in Finland do not receive an induction program or a reduced workload (see Tab. 14).

	Induction Program		Reduced Workload in First Year
	Mandatory	Length	
Finland	Not offered		No
Korea	Mandatory	7 months	No
United States	Varies	1 to 2 years	No
United Kingdom	Mandatory	1 year	Yes
Australia	Varies	Varies	Varies

Note. Data sources – OECD, 2005b. Blank cells indicate that no data are available for that parameter.

Table 14: Beginning Teachers: Induction Programs

In Australia, the State of Victoria developed "The Seven Principles of Highly Effective Professional Learning" (Victorian Government, 2005) which provide the basis for high-quality professional learning at the school, network and region levels, and the New South Wales Institute of Teachers Act, 2004, required the provision of induction programs for all newly-appointed teachers in government schools. A later survey, *Staff in Australia's Schools 2007*, indicated that 67% of early career primary teachers stated that they had been

provided with a mentor and 64% had taken part in an orientation program. It was interesting to note that, only 29% of novice teachers received any follow-up from their teacher education institution (McKenzie et al., 2008).

A novice in any field of employment would need assistance in the early stages of a career, and beginning teachers are no exception (Correa & Wagner, 2011; Gherke, 2001; Ingersoll & Smith, 2004; Ingersoll & Strong, 2011; Langdon, 2011; Le Cornu, 2013; Pillay, Goddard, & Wilss, 2005; Rieg, Paquette, & Chen, 2007; Stansbury & Zimmerman, 2000; Wong, 2004; Zimpher & Rieger, 2001). The success, or otherwise, of such assistance, however, must depend on the ability of the individuals providing the support, the quality of the support program itself, and the ability of the novice to implement recommendations.

Continuing professional development

It is generally considered that continuing professional development (CPD) needs to be maintained throughout a teaching career. It has been suggested that a coherent framework for the provision of quality CPD should be based on two requirements: the needs of individual teachers/schools, and the ability of a system to sustain the professional development program over time (Huber, 2011). In addition, the complexity involved in determining best-practice requires the consideration of a number of variables, including the effectiveness of CPD programs and their impact in the classroom (Lydon & King, 2009); the need for different approaches, such as collaborative enquiry (Fraser et al., 2007); an emphasis on embedding knowledge in practice, including the role of coaching, mentoring, and induction programs (Bezzina, 2006; Helmer, et al., 2010); and more sophisticated methods of evaluating professional development programs (Ingvarson et al., 2004). The 2008 TALIS survey sought to determine what type of professional development teachers undertook and what they perceived their future CPD needs to be. The results indicated that many teachers required training and support in three main areas: teaching students with special learning needs, student discipline and behaviour management, and ICT teaching skills (OECD, 2009a).

PISA provides data (see Tab. 15) on the minimum amount of time that beginning teachers are required to invest in professional development. As this information does not include program method, design, or content it is not possible to comment on the effect of continuing professional development on student achievement.

Continuing Professional Development		
	Minimum Requirement per Year	PD Required for Promotion or Recertification
Finland	Varies: 1-5 days	No
Korea	None	Yes, for promotion
United States	Varies – often 30 hours in first 2-5 years	Yes
United Kingdom	None	Yes, for promotion to principal
Australia	Varies – up to 5 days	Varies

Note. Data sources – OECD, 2005b.

Table 15: Beginning Teachers: Continuing Professional Development

Student Factors

What is it that students bring to the learning environment? Researchers have investigated a number of student factors that may be linked to academic achievement. These factors may be organised into two main categories: (a) the home environment, and (b) student ability, dispositions, and academic experiences (CIEB, n.d.d.; Hattie, 2009; OECD, 2011b; OECD, 2012).

Home environment

In PISA, socioeconomic background is measured by an index of Economic, Social and Cultural Status (ESCS), which is based on student responses to a number of questions (Thomson, De Bortoli, & Buckley, 2013, p.271). The physical home environment includes socio-economic status influences (parental education, parental income, and parental occupation), family structure (single or two-parent, number of children, extended families), and cultural influences (second-language learners, cultural values and beliefs) (Hampden-Thompson, G., 2009; Hattie, 2009; Ruiz et al., 2011; Thomson et al., 2013; Yamamoto, 2010). The Australian PISA results for 2009 indicate that the higher the level of socioeconomic background, the higher student performance is in all three domains: literacy, mathematics, and science (Thomson et al., 2010). The emotional, or socio-psychological, home environment is concerned with the attitudes towards, and the involvement of parents in, education and the school setting (Evans et al., 2010; Hattie, 2009; Park, 2008). In 2009, PISA collected information concerning parental involvement in education. Findings suggest that reading to children when they are young, engaging in discussions that promote critical thinking, and setting a good example are related to academic outcomes (Borgonovi & Montt, 2012). Hattie (2009, p.297-298), also found that socioeconomic status has a role in student achievement, but, of the top 30 influences on student success, 27 factors are linked to the teacher, teaching, school and curriculum, and 3 are related to the student. Home environment and socioeconomic status are ranked 31 and 32 respectively. Furthermore, home environment and socioeconomic status are not easily changed.

Student ability, dispositions, and academic experiences

Research has shown that student ability and disposition towards learning (concentration, perseverance, motivation, self-efficacy, prior achievement, and investment in learning) is related to academic success (Freiberger, Steinmayr, & Spinath, 2012; Medford & McGeown, 2012; Yeung, 2011). A study by Hornstra et al. (2013) found that, regardless of background, motivation is positively related to school success beyond what can be explained by cognitive ability. In addition, the research of Caprara et al. (2011), suggests that self-efficacy beliefs contribute to high-school success over the effects of socioeconomic status and prior achievement.

Academic experiences (attendance at pre-school, early intervention programs, and participation in out-of-school tutorial classes) have also been associated with better academic performance (Caprara et al., 2011; Lasser & Fite, 2011; OECD, 2012). Data provided by PISA 2012 indicate that 79% of 4-year-olds are enrolled in early childhood programs across OECD countries as a whole and that this experience is associated with better school performance. Attendance at out-of-school tutorial centres, however, does not appear to

guarantee later success. Of the top ranking countries considered in this paper, an estimated 80% of students in Shanghai (China), 75% in Hong Kong (China) and 79% in Korea attend out-of-school tutoring centres (CIEB, n.d.c.; OECD, 2011b), whereas only 23.5% of Finnish students, also among the top performers, attend after-school coaching (OECD, 2011b).

Research by Hattie (2009), has also indicated that student ability, dispositions, and attitudes to learning are the main student influences on student achievement. Based on the assumption that the range of student personalities and abilities is similar across countries and that other elements of the home environment appear to have less impact on student success, student factors that might be amenable to change (e.g., motivation, perseverance, and self-efficacy) could also be influenced by quality of instruction.

Factors with the Potential to Impact Student Achievement

The comparative data provided by PISA, PIRLS, and TIMSS do not indicate a clear relationship between the following factors and the percentage of students who fall in the lower levels of student achievement: (a) investment in education, (b) teacher salary, (c) curriculum, (d) assessment programs, (e) minimum academic requirements for entry into teacher education programs, (f) compulsory instruction time, and (g) class size. What is clear from international assessment data and the available research evidence, however, is that both teachers and the students themselves make the biggest contributions towards student achievement (Darling-Hammond, 2000; Hattie, 2009; Rowe, 2003). This position was strongly argued by Hattie at the ACER National Conference in 2003. He presented data that illustrated the major influences on student success. Of the six factors proffered, two accounted for 80% of the variance in student achievement: the students themselves (50%) and their teachers (30%) (Hattie, 2003, pp.1-3).

Student achievement is highly related to teacher quality (Rowe, 2003), and teacher quality appears to be linked to (a) the academic ability of students accepted into teacher preparation programs (U.S. Department of Education, 2003) and (b) the content and quality of teacher training programs (Begeny & Martens, 2006). Although it may not be possible to compare pre-service teacher education programs across countries that participate in the international assessment programs, it is possible to consider important components that have been suggested as core requirements, such as: subject content knowledge (Ingvarson et al., 2004; Louden et al., 2005; Schleicher, 2012), pedagogy (Ingvarson et al., 2004; Schleicher, 2012), classroom management (Hartsuyker, 2007), meeting the needs of diverse learners (Louden et al., 2005), assessment and monitoring (Hattie & Timperley, 2007; Jensen, 2010), curriculum planning (Ingvarson et al., 2004), and practicum experiences (Hudson & Hudson, 2013; Ingvarson et al., 2004; Rowe, 2005).

The issues concerning the 'teacher factor' were neatly summed up by Cooper and Alvarado, (2006) who stated that "recruiting academically successful university students into teaching, preparing them well for the challenges of teaching, and retaining them in the profession have all become key goals in helping students achieve high academic standards" (p. 5). A fundamental issue, however, is the lack of evidence on the effectiveness of different approaches to teacher education and preparation for teaching in the classroom (Hartsuyker, 2007).

Implications for Teacher Education

The future of any nation rests on the quality of its education system. In order to increase student performance and to ensure that quality teaching occurs in the classroom, tertiary institutions and governments need to ensure that the best candidates are attracted to the teaching profession. In addition, they need to provide quality teacher training programs (with evidence-based content and pedagogy) designed to match the requirements of the 21st century (Boyd et al., 2009; Hanushek, 2010; Rowe, 2003; Walsh, 2006).

Several Australian reviews of teacher performance and teacher training have been commissioned over the last 25 years with the intent of improving the quality of teacher education, but little seems to change (Adey, 1998; Australian Education Union (AEU), 2007; A.E.U., 2008; DEST, 2003; Dyson, 2005; Hartsuyker et al, 2007; Ingvarson et al, 2004: Louden et al, 2005; Ramsey, 2000; Rowe, 2005). In 2012, the Australian Government's Productivity Report still noted a decline in literacy and numeracy standards in Australian schools, and commented on the need to raise teacher quality by improving teacher training, induction, and mentoring (Australian Productivity Commission, 2012).

In 2000, Ramsey wrote:

> The debate of the past 20 years about standards and how to improve the quality of teacher education has run its course. It is time to move forward. Most teacher educators and teachers are now at the point where they are disillusioned by seemingly endless debate and a repetitive chain of reviews which, in spite of their findings and recommendations in such critical areas as funding, standards of professional practice, accreditation of initial teacher education programs and teacher licensing, fail them (p. 31).

In Australia, there have been some initiatives: The New South Wales Institute of Teachers was established in 2004 and since that time has overseen a system of accreditation and recognition of a teacher's professional capacity against professional standards. It has also provided a process for the profession to influence the quality of teacher training and continuing professional development (Schuck et al., 2011). Similar organisations operate in other States and Territories: the ACT Teacher Quality Institute, the Teacher Registration Board of the Northern Territory, the Queensland College of Teachers, the Teachers Registration Board of South Australia, the Registration Board of Tasmania, The Victoria Institute of Teaching, and the Teacher Registration Board of Western Australia. For real change to occur, however, governmental policies and procedures need to be developed that will (a) promote the selection of top students into initial teacher education, and (b) ensure the provision of comprehensive, high-quality teacher preparation programs at tertiary institutions.

Conclusion

International assessment programs, such as PIRLS, TIMSS, and PISA provide opportunities for student performance to be compared over time, both within a given country and across countries. Perceptions of declining standards in literacy and numeracy have been noted in Australia, the United Kingdom, and the United States at the same time that Finland, Korea, Hong Kong (China), and Shanghai (China) have topped international rankings in both areas. Although the results of the international assessments do not provide clear evidence of declining literacy and numeracy standards in Australia, the number of students achieving at the lowest proficiency levels is unacceptably large and compares unfavourably with the highest performing countries participating in these assessments. In order to determine factors that may impact on student achievement, it is necessary to consider the contributions made by educational systems, students, and teachers. A comparison of organisational factors in

international educational systems, such as investment in education, teacher salary, curriculum provision, assessment programs, and class size, is inconclusive. Hattie (2009) has suggested that student ability and personal attitudes and dispositions towards learning, in conjunction with the quality of teaching that occurs in the classroom, are the main factors contributing to student success. As it is not possible to control the abilities, prior experiences, and attitudes that a student brings to the learning environment, the teacher must be considered the principal contributor to student achievement. Teacher quality, then, should be the primary concern of any educational system. Policy makers and course coordinators in tertiary institutions need to work together to develop selection processes for choosing the best candidates to undertake teacher training; the provision of relevant, evidence-based, pre-service teacher training programs; followed by coherent in-school coaching, mentoring, and continued professional development.

References

Adey, K.C. (1998). *Preparing a profession: Report of the National Standards and Guidelines for initial teacher education project*. Canberra, ACT: ACDE.

Altinok, N., & Kingdon, G. (2012). New evidence on class size effects: A pupil fixed effects approach. *Oxford Bulletin of Economics and Statistics, 74*, 203-234. ttp://dx.doi.org/10.1111/j.1468-0084.2011.00648.x

Auguste, N., Kihn, P., & Miller, M. (2010). *Closing the talent gap: Attracting and retaining top-third graduates to careers in teaching*. Retrieved from http://www.mckinsey.com

Australian Curriculum, Assessment and Reporting Authority (ACARA). (2011). *NAPLAN Achievement in reading, persuasive writing, language conventions and numeracy: National report for 2011*. Sydney, NSW: Author.

Australian Curriculum, Assessment and Reporting Authority (ACARA). (2012). *Measurement framework for schooling in Australia*. Sydney, NSW: Author.

Australian Education Union. (2007). *Beginning teacher survey 2007: Results and report*. South Bank, Vic.: Australian Education Union. Retrieved from http://www.aeufederal.org.au/Publications/2008/Btsurvey07res.pdf

Australian Education Union. (2008). *New educators survey 2008: Results and report*. South Bank, Vic.: Australian Education Union. Retrieved from: http://www.aeufederal.org.au/Publications/2009/Nesurvey08res.pdf

Australian Productivity Commission. (2012). *Schools workforce: Key points*. Retrieved from http://www.pc.gov.au/ projects/study/education-workforce/schools/report/kep-points

Baer, J., Kutner, M., & Sabatini, J. (2009). *Basic reading skills and the literacy of America's least literate adults: Results from the 2003 National Assessment of Adult Literacy (NAAL) Supplemental Studies* (NCES 2009-481). Washington, DC: U.S. Department of Education.

Bailey, J. (2010, May 9). You wouldn't read about it. *The Age*. Retrieved from http://www.theage.com.au

Begeny , J.C., & Martens, B.K. (2006). Assessing pre-service teachers' training in empirically-validated behavioral instruction practices. *School Psychology Quarterly, 21*, 262-285. http://dx.doi.org/10.1521/scpq.2006.21.3.262

Bezzina, C. (2006). Views from the trenches: Beginning teachers' perceptions about their professional development. *Journal of In-service Education, 32*, 411-430. http://dx.doi.org/10.1080/13674580601024515

Biddle, B.J., & Berliner, D.C. (2002). Small class size and its effects. *Educational Leadership. 59*, 12-23.

Boe, E.E., Shin, S., & Cook, L.H. (2007). Does teacher preparation matter for beginning teachers in either special or general education? *The Journal of Special Education, 41*, 158-170.

Bonnor, C. (2010, December 9). Misguided schools 'market' sees us slip down the ranks. *Sydney Morning Herald*. Retrieved from http://www.smh.com.au

Borgonovi, F., & Montt, G. (2012). *Parental involvement in selected PISA countries and economies*. OECD Education Working Paper number 73. Paris, France: OECD. http://dx.doi.org/10.1787/5k990rk0jsjj-en

Boyd, D.J., Grossman, P.L., Lankford, H., Loeb, S., & Wyckoff, J. (2009). Teacher preparation and student achievement. *Educational Evaluation and Policy Analysis, 31*, 416-440. http://dx.doi.org/10.3102/0162373709353129

Caprara, G.V., Vecchione, M., Alessandri, G., Gerbino, M., & Barbaranelli, C. (2011). The contribution of personality traits and self-efficacy beliefs to academic achievement: A

longitudinal study. *British Journal of Educational Psychology, 81*, 78-96. http://dx.doi.org/10.1348/2044-8279.002004

Carter, H., Amrein-Beardsley, A., & Hansen, C.C. (2011). So NOT amazing! Teach for America corps members' evaluation of the first semester of their teacher preparation program. *Teachers College Record, 113*, 861-894.

Carter, M., & Wheldall, K. (2008). Why can't a teacher be more like a Scientist? Science, pseudoscience and the art of teaching. *Australasian Journal of Special Education, 32*, 5-21. http://dx.doi.org/10.1080/10300110701845920

Center on International Education Benchmarking. (n.d.a). *Australia – teacher and principal quality.* Retrieved from http://www.ncee.org/programs-affiliates/center-on-international-education-benchmarking/top-performing-countries/australia-overview/australia-teacher-and principal-quality/

Center on International Education Benchmarking. (n.d.b). *Finland – teacher and principal quality.* Retrieved from http://www.ncee.org/programs-affiliates/center-on-international-education-benchmarking/top-performing-countries/finland-overview/finland-teacher-and-principal-quality/

Center on International Education Benchmarking. (n.d.c). *Korea – teacher and principal quality.* Retrieved from http://www.ncee.org/programs-affiliates/center-on-international-education-benchmarking/top-performing-countries/south-korea-overview/south-korea-teacher-and-principal-quality/

Center on International Education Benchmarking. (n.d.d). *Shanghai-China –instructional systems.* Retrieved from http://www.ncee.org/ programs-affiliates/center-on-international-education-benchmarking/top-performing-countries/shanghai-china/shanghai-china-instructional-systems/

Center on International Education Benchmarking. (n.d.e). *Shanghai – teacher and principal quality.* Retrieved from: http://www.ncee.org/programs-affiliates/center-on-international-education-benchmarking/top-performing-countries/shanghai-china/shanghai-china-teacher-and-principal-quality/

Center on International Education Benchmarking. (n.d.f). *South Korea – instructional systems.* Retrieved from http://www.ncee.org/programs-affiliates/center-on-international-education-benchmarking/top-performing-countries/south-korea-overview/south-korea-instructional-systems/

Chingos, M.M. (2012). The impact of a universal class-size reduction policy: Evidence from Florida's statewide mandate. *Economics of Education Review, 31*, 543-562. http://dx.doi.org/10.1016/j.econedurev.2012.03.002

Coalition for Psychology in Schools and Education. (2006). *Report on the teacher needs survey.* Washington, D.C.: American Psychological Association, Center for Psychology in Schools and Education. Retrieved from http://www.tne.uconn.edu/Announcements/tns_execsummary.pdf

Cooper, J.M., & Alvarado, A. (2006). *Preparation, recruitment and retention of teachers*. Paris, France: UNESCO.

Corbell, K.A. (2009). *Strategies that can reduce new teacher attrition in North Carolina.* North Carolina: Friday Institute for Educational Innovation, North Carolina State University. Retrieved from https://www.fi.ncsu.edu/assets/podcast_episodes/white-paper-series/strategies-that-can-reduce-new-teacher-attrition-in-north-carolina.pdf

Correa, V.I. & Wagner, J.Y. (2011). Principals' roles in supporting the induction of special education teachers. *Journal of Special Education Leadership, 24*, 17-25.

Council of Australian Governments (COAG). (2009). *National partnership agreement on improving teacher quality.* Retrieved from

http://www.federalfinancialrelations.gov.au/content/national_partnership_agreements/education.aspx

Crowley, R., (1998). *A class act: Inquiry into the status of the teaching profession*. Canberra, ACT: Senate Employment, Education and Training References Committee, Australia Parliament Senate.

Darling-Hammond, L. (2000). Teacher quality and student achievement: a review of state policy evidence. *Education Policy Analysis Archives, 8*, 1-44.

Department for Education (UK). (n.d.) *Class size and education in England evidence report*. (Research Report No. DFE-RR169). Retrieved from https://www.education.gov.uk/publications/eOrderingDownload/DFE-RR169.pdf

Department of Education, Science and Training (DEST). (1997). *Mapping literacy achievement: results of the 1996 National School English Literacy Survey.* Retrieved from http://www.dest.gov.au/archive/schools/literacy&numeracy/summary.htm#PerformanceinReadinMainSample

Department of Education, Science and Training. (2003). *Australia's teachers: Australia's future: Advancing innovation, science technology and mathematics.* Retrieved from http://www.dest.gov.au/NR/rdonlyres/14C1A4EA-F405-4443-B6BB-395B5ACED1EA/1662/Main_Report.pdf

Dyson, M. (2005). Australian teacher education: Although reviewed to the eyeball is there evidence of significant change and where to now? *Australian Journal of Teacher Education 30*, 37-54. http://dx.doi.org/10.14221/ajte.2005v30n1.4

Evans, M.D.R., Kelley, J., Sikora, J., & Treiman, D.J. (2010). Family scholarly culture and educational success: Books and schooling in 27 nations. *Research in Social Stratification and Mobility, 28*, 171-197. http://dx.doi.org/10.1016/j.rssm.2010.01.002

Ferrari, J. (2012, February 17). Lessons from Asia show way forward for schools. *The Australian*. Retrieved from http://www.theaustralian.com.au

Fraser, C., Kennedy, A., Reid, L., & McKinney, S. (2007). Teachers' continuing professional development: Contested concepts, understandings and models. *Journal of In-service Education, 33*, 153-169. http://dx.doi.org/10.1080/13674580701292913

Freiberger, V., Steinmayr, R., & Spinath, B. (2012). Competence beliefs and perceived ability evaluations: How do they contribute to intrinsic motivation and achievement? *Learning & Individual Differences, 22*, 518-522. http://dx.doi.org/10.1016/j.lindif.2012.02.004

Galton, M., & Pell, T. (2012). Longitudinal effects of class size reductions on attainment: Results from Hong Kong primary classrooms. *International Journal of Educational Research, 53*, 360-369. http://dx.doi.org/10.1016/j.ijer.2012.05.001

Gherke, N. (2001). Toward a definition of mentoring. *Theory into Practice, 27*(3), 190-194. ttp://dx.doi.org/10.1080/00405848809543350

Gore, J., Ladwig, J., Griffiths, T., & Amosa, W. (2007, November). *Data-driven guidelines for high quality teacher education*. Paper presented at the Australian Association for Research in Education conference. Retrieved from http://publications.aare.edu.au/07pap/gor07285.pdf

Greenberg, J., McKee, A., & Walsh, K. (2013). *Teacher Prep Review*. National Council on Teacher Quality. Retrieved from http://media.npr.org/assets/news/2013/teacherprep.pdf

Hampden-Thompson, G. (2009). Are two better than one? A comparative study of achievement gaps and family structure. *Compare: A Journal of Comparative & International Education, 39*, 513-529. http://dx.doi.org/10.1080/03057920802366372

Hanushek, E.G. (2000). Evidence, politics and the class size debate. In L. Mishel, & R. Rothstein, (Eds.), *The class size debate.* (pp. 37-66). Washington, DC: Economic Policy Institute.

Hanushek, E.A. (2010). The difference is teacher quality. In K. Weber (Ed.), *Waiting for "Superman": How we can save America's failing public schools.* NY: Public Affairs. Retrieved from http://hanushek.stanford.edu/sites/default/files/publications/Hanushek%202010%20Superman.pdf

Hartsuyker, L., Sawford, R., Bartlett, K., Bird, S., Corcoran, A., Fawcett, D., . . . Markus, L. (2007). *Top of the class: Report on the inquiry into teacher education.* Canberra, ACT: Commonwealth of Australia.

Hassan, A. A., Khaled, A., & Kaabi, A.A. (2010). Perceived teacher preparation within a college of education teaching program. *International Journal of Applied Educational Studies, 9*, 10-32.

Hattie, J.A. (2003, October). *Teachers make a difference: what is the research evidence?* Paper presented at the ACER Conference on Building Teacher Quality: What Does the Research Tell Us? Melbourne, Vic. Retrieved from http://research.acer.edu.au/research_conference_2003/4

Hattie, J.A. (2005). The paradox of reducing class size and improving learning outcomes. *International Journal of Educational Research, 43*, 387-425. http://dx.doi.org/10.1016/j.ijer.2006.07.002

Hattie, J.A. (2009). *Visible Learning: A synthesis of over 800 meta-analyses relating to achievement.* London, UK: Routledge.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research, 77*, 81-112. doi: 10.3102/00346530298487

Hayes, P., Noonan, P., & Heldsinger, S. (2010) *Linking teachers' knowledge with student performance.* Crawley, W.A.: Catholic Education Office of Western Australia.

Helmer, J., Bartlett, C., Wolgemuth, J.R., & Lea, T. (2010). Coaching (and) commitment: Linking ongoing professional development, quality teaching and student outcomes. *Professional Development in Education, 37*, 197-211. http://dx.doi.org/10.1080/19415257.2010.533581

Henry, G.T., Bastian, K.C., & Fortner, C.K. (2011). Stayers and leavers: Early-career teacher effectiveness and attrition. *Educational Researcher, 40*, 271-280. http://dx.doi.org/10.3102/0013189X11419042

Hornstra, L., van der Veen, I., Peetsma, T., & Volman, M. (2013). Developments in motivation and achievement during primary school: A longitudinal study on group-specific differences. *Learning & Individual Differences, 23*, 195-204. http://dx.doi.org/10.1016/j.lindif.2012.09.004

Huber, S.G. (2011). The impact of professional development: a theoretical model for empirical research, evaluation, planning and conducting training and development programmes. *Professional Development in Education, 37*, 837-853. http://dx.doi.org/10.1080/19415257.2011.616102

Hudson, S., & Hudson, P. (2013). Re-structuring preservice teacher education: Introducing the school-community integrated learning (SCIL) pathway. *Journal of Education and Learning, 2*, 9-19. http://dx.doi.org/10.5539/jel.v2n1p9

Industry Skills Council. (2011). *No more excuses: An industry response to the language, literacy and numeracy challenge*. Retrieved from http://www.isc.org.au/pdf/NoMoreExcuses_FINAL%20single%20page.pdf

Ingersoll, R.M., & Smith, T.M. (2004). Do teacher induction and mentoring matter? *NASSP Bulletin, 88*, 28-40. http://dx.doi.org/10.1177/019263650408863803

Ingersoll, R.M., & Stronge, M. (2011). The impact of induction and mentoring programs for beginning teachers: A critical review of the research. *Review of Educational Research, 81*, 201-233. http://dx.doi.org/10.3102/0034654311403323

Ingvarson, L., Beavis, A., Kleinhenz, E., & Elliott, A. (2004). *Pre-service teacher education in Australia: A mapping study of selection processes, course structure and content, and accreditation processes.* Retrieved from http://research.acer.edu.au/teacher_education/3

Ingvarson, L., & Rowe, K., (2007). *Conceptualising and evaluating teacher quality: Substantive and methodological issues.* Retrieved from http://research.acer.edu.au/learning_processes/8

Jensen, B. (2010). *Measuring what matters: Student progress*. Grattan Institute. Retrieved from http://grattan.edu.au/publications/reports/post/measuring-what-matters-student-progress/

Jensen, B., Sandoval-Hernandez, A., Knoll, S., & Gonzalez, E.J. (2012). *The experience of new teachers: Results from TALIS 2008*. Paris: OECD Publishing. Retrieved from http://www.oecd.org/edu/school/49846877.pdf

Kearney, S. P. (2011, January). *The importance of induction programmes for beginning teachers in independent Catholic secondary schools in New South Wales*. Paper presented at the 9th Annual Hawaii International Conference on Education. Honolulu, Hawaii. Retrieved from http://researchonline.nd.edu.au/edu_conference/39/

Kingston, P. (2009, January 29). 'Dismal picture' of adult literacy in UK. *The Guardian*. Retrieved from http://www.guardian.co.uk

Konstantopoulos, S. (2011). How consistent are class size effects? *Evaluation Review, 35*, 71-92. http://dx.doi.org/10.1177/0193841X11399847

Kosnik, C., & Beck, C. (2008). We taught them about literacy but what did they learn? The impact of a preservice teacher education program on the practices of beginning teachers. *Studying Teacher Education, 4*, 115-128.

Kwong Lee Dow, (2003). *Australia's teachers: Advancing innovation, science, technology and mathematics.* Canberra, ACT: Committee for the Review of Teaching and Teacher Education.

Langdon, F. (2011). Shifting perception and practice: New Zealand beginning teacher induction and mentoring as a pathway to expertise. *Professional Development in Education, 37*, 241-258. http://dx.doi.org/10.1080/19415257.2010.509658

Lasser, J., & Fite, K. (2011). Universal preschool's promise: Success in early childhood and beyond. *Early Childhood Education Journal, 39*, 169-173. doi: 10.1007/s10643-011-0499-x

Laurie, V. (2012, April 14). Back to school. *The Australian*. Retrieved from http://www.theaustralian.com.au

Le Cornu, R. (2013). Building early career teacher resilience: The role of relationships. *Australian Journal of Teacher Education, 38*(4), 1-16. http://dx.doi.org/10.14221/ajte.2013v38n4.4

Leigh, A., & Ryan, C. (2008). *How has school productivity changed in Australia?* Canberra, ACT: Australian Department of Education Science and Training.

Levine, A. (2006). *Educating school teachers*. The Education Schools Report. Retrieved from http://www.edschools.org/pdf/Educating_Teachers_Report.pdf

Liston, D., Whitcomb, J., & Borko, H. (2006). Too little or too much: Teacher preparation and the first years of teaching. *Journal of Teacher Education, 57*, 351-358. http://dx.doi.org/10.1177/0022487106291976

Louden, W., Rohl, M., Barratt-Pugh, C., Brown, T.C., Elderfield, J., House, H., . . . Rowe, K. (2004). In teachers' hands: Effective literacy teaching practices in the early years of schooling. *Australian Journal of Language and Literacy, 28*, 175-255.

Louden, W., Rohl, M., Gore, J., McIntosh, A., Greaves, D., Wright, R., Siemon, D., & House, H. (2005). *Prepared to teach: An investigation into the preparation of teachers to*

teach literacy and numeracy. Canberra, ACT: Australian Department of Education, Science and Training.

Lydon, S., & King, C. (2009). Can a single, short continuing professional development workshop cause change in the classroom? *Professional Development in Education, 35*, 63-82. http://dx.doi.org/10.1080/13674580802264746

Mackay, A. (2013). *Initial teacher education: Data report*. Carlton South: Australian Institute for Teaching and School Leadership. Retrieved from http://www.aitsl.edu.au/verve/_resources/2013_AITSL_ITE_Data_Report.pdf

Maher, S. (2011, April 4). Millions behind on basic skills, threatens Australia's international competitiveness. *The Australian*. Retrieved from http://www.theaustralian.com.au

Manuel, J. (2003, January). Have we 'mistaken the symptom for the problem'?*: Exploring issues of early career teacher retention and attrition. *Curriculum Leadership: an Electronic Journal for Leaders in Education.* Retrieved from http://www.curriculum.edu.au/leader/have_we_mistaken_the_symptom_for_the_problem*:_ex,4622.html?issueID=9691

McColskey, W., Stronge, J.H., Ward, T.J., Tucker, P.D., Howard, B., Lewis, K., & Hindman, J.L. (2005). *A comparison of National Board certified teachers and non-National Board certified teachers: Is there a difference in teacher effectiveness and student achievement?* National Board for Professional Teaching Standards. Retrieved from http://www.education-consumers.com/articles/W-M%20NBPTS%20certified%20report.pdf

McKenzie, P., Kos, J., Walker, M., & Hong, J. (2008). *Staff in Australia's schools 2007*. Camberwell, Vic: Australian Council for Educational Research.

Medford, E. & McGeown, S.P. (2012). The influence of personality characteristics on children's intrinsic reading motivation. *Learning and Individual Differences, 22*, 786-791. http://dx.doi.org/10.1016/j.lindif.2012.06.002

Micklewright, J., & Schnepf, S.V. (2006). *Response bias in England in PISA 2000 and 2003*. Research Report No. 771. Southampton Statistical Sciences Research Institute (S3RI), Southampton, UK: University of Southampton.

Mosteller, F. (1995). The Tennessee study of class size in the early school grades. *Critical Issues for Children and Youths 5*, 113-127.

Mullis, I.V.S., Martin, M.O., Beaton, A. E., Gonzalez, E.J., Kelly, D.L., & Smith, T.A. (1998). *Mathematics achievement in the primary school years: IEA's third international mathematics and science study (TIMSS)*. Chestnut Hill, MA: Boston College. Retrieved from http://timssandpirls.bc.edu/timss1995i/TIMSSPDF/P1HiLite.pdf

Mullis, I.V.S., Martin, M.O., Foy, P., & Drucker, K.T. (2012). *The PIRLS 2011 international results in reading*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College. Retrieved from http://timssandpirls.bc.edu/pirls2011/international-results-pirls.html

Mullis, I.V.S., Martin, M.O., & Foy, P. (with Olson, J.F., Preuschoff, C., Erberber, E., Arora, A., & Galia, J.). (2008). *TIMSS 2007 International mathematics report: Findings from IEA's trends in international mathematics and science study at the fourth and eighth grades.* Chestnut Hill, MA: Boston College. Retrieved from http://timss.bc.edu/timss2007/PDF/T07_M_IR_Chapter1.pdf 16/05/13

Mullis, I.V.S., Martin, M.O., Gonzalez, E.J., & Chrostowski, S. J. (2004). *TIMSS 2003 international mathematics report findings from IEA's trends in international mathematics and science study at the fourth and eighth grades.* Chestnut Hill, MA: Boston College. Retrieved from http://timss.bc.edu/PDF/t03_download/T03_M_Chap1.pdf

Mullis, I. V.S., Martin, M.O., Gonzalez, E.J., Gregory, K. D., Garden, R.A., O'Connor, K.M., Chrostowski, S.J., & Smith, T.A. (2000). *TIMSS 1999 international mathematics report findings from IEA's repeat of the third international mathematics and science study at the eighth grade* Retrieved from http://timss.bc.edu/timss1999i/pdf/T99i_Math_1.pdf

Murray, S., Nuttall, J., & Mitchell, J. (2008). Research into initial teacher education in Australia: A survey of the literature 1995-2004. *Teaching and Teacher Education, 24*, 225-239. http://dx.doi.org/10.1016/j.tate.2007.01.013

NSW Government. (n.d.) *Submission to the Productivity Commission's Education and Training: schools*. Retrieved from www.pc.gov.au/__data/assets/pdf_file/0016/111652/sub014.pdf

Nye, B., Hedges, L.V., & Konstantopoulos, S. (1999). The long-term effects of small classes: A five-year follow-up of the Tennessee class size experiment. *Educational Evaluation & Policy Analysis, 21*, 127-142. http://dx.doi.org/10.3102/01623737021002127

OECD. (2001). *Knowledge and skills for life: First results from the OECD Programme for International Student Assessment (PISA) 2000*. Paris, France. Retrieved from: http://www.oecd.org/edu/school/programmeforinternationalstudentassessmentpisa/33691596.pdf

OECD. (2003a). *Attracting, developing and retaining effective teachers: country background report for Finland.* Paris, France. Retrieved from http://www.oecd.org/dataoecd/43/15/5328720.pdf

OECD. (2003b). *Learning for tomorrow's world: First results from PISA 2003.* Paris, France. Retrieved from http://www.oecd.org/education/school/programmeforinternationalstudentassessmentpisa/34002216.pdf

OECD. (2004). *Education at a glance 2004.* Retrieved from http://www.oecd.org/edu/highereducationandadultlearning/educationataglance2004-home.htm

OECD. (2005a). *Teachers matter: Attracting, developing and retaining effective teachers.* Paris, France.

OECD. (2005b). *Attracting, developing and retaining effective teachers - final report: Teachers matter.* Retrieved from http://www.oecd.org/edu/preschoolandschool/35004115.pdf

OECD. (2007). *The Programme for International Student Assessment (PISA).* Paris, France. Retrieved from http://www.oecd.org/pisa/pisaproducts/pisa2006/39725224.pdf

OECD. (2008). *Education at a glance 2008: Highlights*. *OECD indicators.* Paris, France: Author. Retrieved from http://www.ict-21.ch/com-ict/IMG/pdf/EducationataGlanceOECDIndicators20089608041E.pdf

OECD. (2009a). *Creating effective teaching and learning environments: First results from TALIS*. Paris, France. Retrieved from http://www.oecd.org/edu/school/43023606.pdf

OECD. (2009b). *PISA 2009 assessment framework: Key competencies in reading, mathematics and science.* Paris, France. Retrieved from http://www.oecd.org/pisa/pisaproducts/44455820.pdf

OECD. (2009c). *PISA 2009 results: What students know and can do.* Paris, France. Retrieved from http://www.oecd.org/pisa/pisaproducts/48852548.pdf

OECD. (2009d). *PISA Take the test: Sample questions from the OECD's PISA assessments*. Paris, France. Retrieved from http://www.oecd.org/pisa/pisaproducts/pisa2006/pisatakethetestsamplequestionsfromoecdspisaassessments.htm

OECD. (2010a). *PISA 2009 at a glance*. Paris, France. Retrieved from http://dx.doi.org/10.1787/9789264095298-en

OECD. (2010b). *The high cost of low educational performance: The long-run economic impact of improving PISA outcomes*. Paris, France. Retrieved from http://www.oecd.org/dataoecd/11/28/44417824.pdf

OECD. (2010c). *Strong performers and successful reformers in education: lessons from PISA for the United States.* Paris, France. Retrieved from http://www.oecd.org/document/13/0,3746,en_2649_35845621_46538637_1_1_1_1,00.html

OECD. (2010d). *PISA 2009 Results: What students know and can do – student performance in reading, mathematics and science.* Paris, France. Retrieved from http://www.oecd.org/pisa/pisaproducts/48852548.pdf

OECD. (2011a). *Education at a glance 2011: Highlights*. *OECD indicators.* Paris, France: Author. Retrieved from http://dx.doi.org/10.1787/eag-2011-en

OECD. (2011b). *Quality time for students: Learning in and out of school*. Paris, France. Retrieved from http://dx.doi.org/10.1787/9789264087057-en

OECD. (2011c). *The learning environment and organisation of schools*. Paris, France. Retrieved from http://www.oecd.org/education/highereducationandadultlearning/48631122.pdf

OECD. (2012). *Education at a glance 2012: OECD indicators.* Paris, France. http://dx.doi.org/10.1787/eag-2012-en

OECD. (2013a). *PISA 2012 results: What students know and can do. Student performance in mathematics, reading and science. Vol. 1.* Paris, France. Retrieved from http://www.oecd.org/pisa/keyfindings/pisa-2012-results-volume-I.pdf

OECD. (2013b). *PISA in focus n34.* Paris, France. Retrieved from http://www.oecd.org/pisa/pisaproducts/pisainfocus/pisa-in-focus-n34-(eng)-FINAL.pdf

OECD. (2013c). *Programme for the International Assessment of Adult Competencies (PIACC).* Paris, France. Retrieved from http://www.oecd.org/site/piaac/surveyofadultskills.htm

Office for Standards in Education (OFSTED). (2011). *Tackling the challenge of low numeracy skills in young people and adults: Report summary.* Manchester, U.K.

Office for Standards in Education (OFSTED). (2012). *Moving English forward*. Manchester, U.K.

Park, H. (2008). Home literacy environments and children's reading performance: A comparative study of 25 countries. *Educational Research and Evaluation: An International Journal of Theory and Practice, 14*, 489-505. http://dx.doi.org/10.1080/13803610802576734

Pillay, H., Goddard, R., & Wilss, L. (2005). Well-being, burnout and competence: Implications for teachers. *Australian Journal of Teacher Education, 30*(2), 22-33. http://dx.doi.org/10.14221/ajte.2005v30n2.3

Plunkett, M., & Dyson, M. (2011). Becoming a teacher and staying one: Examining the complex ecologies associated with educating and retaining new teachers in rural Australia. *The Australian Journal of Teacher Education, 36*, 32-47. http://dx.doi.org/10.14221/ajte.2011v36n1.3

Ramsey, G. (2000). *Quality matters revitalising teaching: Critical times, critical choices. Report of the Review of Teacher Education*. Sydney, NSW: New South Wales Government.

Reading decline triggers alarm. (2012, April 23). *Sydney Morning Herald*. Retrieved from http://www.smh.com.au

Rieg, S.A., Paquette, K.R., & Chen, Y. (2007). Coping with stress: An investigation of novice teachers' stressors in the elementary classroom. *Education, 128*(2), 211-256.

Rockoff, J.E. (2003). *The impact of individual teachers on student achievement: evidence from panel data.* Cambridge, MA: Harvard University: Kennedy School of Government.

Rockoff, J. (2008). *Does mentoring reduce turnover and improve skills of new employees? Evidence from teachers in New York City.* Retrieved from http://www.immagic.com/eLibrary/ARCHIVES/GENERAL/NBER_US/N080312R.pdf

Rohl, M., & Greaves, D. (2004). How are pre-service teachers in Australia being prepared for teaching literacy and numeracy to a diverse range of students? *Australian Journal of Learning Disabilities, 10*, 3-8. http://dx.doi.org/10.1080/19404150509546780

Rosenberg, J. (2012, January 24). NAPLAN results show top students' standards drop. *Sydney Morning Herald*. Retrieved from http://www.smh.com.au

Rowe, K. (2003). *The importance of teacher quality as a key determinant of students' experiences and outcomes of schooling*. Retrieved from http://research.acer.edu.au/research_conference_2003/3

Rowe, K.J. (2005). *Teaching reading. National inquiry into the teaching of literacy*. Canberra, ACT: Australian Government. Department of Education, Science and Training.

Rubie-Davies, C., Hattie, J., & Hamilton, R. (2006). Expecting the best for students: teacher expectations and academic outcomes. *British Journal of Educational Psychology, 76,* 429-444. http://dx.doi.org/10.1348/000709905X53589

Ruiz, G.R., Arrebola, I.A., & Gomez, M.M.O. (2011). Influence of family factors in school drop-out: A study within a multicultural context. *Electronic Journal of Research in Educational Psychology: 9*, 1377-1402.

Schuck, S., Aubusson, P., Buchanan, J., Prescott, A., Louviere, J., & Burke, P. (2011). *Retaining Effective Early Career Teachers in NSW Schools*. Lindfield, NSW: UTS: Centre for Research in Learning and Change and Centre for Study of Choice. Retrieved from http://www.rilc.uts.edu.au/pdfs/Beginning_Teacher_Retention_Report.pdf

Schleicher, A. (2012), (Ed.), *Preparing Teachers and Developing School Leaders for the 21st Century: Lessons from around the world*. OECD Publishing. doi: 10.1787/9789264xxxxxx-en

Sclafani, S.K. (2011, March). *Recruiting, training and supporting a 21st century teaching profession*. Paper presented at the International Summit on the Teaching Profession. Retrieved from http://hub.mspnet.org/index.cfm/22821

Stanford, P. (2011, August 28). Achieving excellence with a class of 71. *The Telegraph*. Retrieved from http://www.telegraph.co.uk

Stansbury, K. & Zimmerman, J. (2000). *Designing support for beginning teachers*. WestEd, 1-15.

Stronge, J.H., Ward, T.J., & Grant, L.W. (2011). What makes teachers good? A cross-case analysis of the connection between teacher effectiveness and student achievement. *Journal of Teacher Education, 62*, 339-355. http://dx.doi.org/10.1177/0022487111404241

Stronge, J.H., Ward, T.J., Tucker, P.D., & Hindman, J.L. (2008). What is the relationship between teacher quality and student achievement? An exploratory study. *Journal of Personnel Evaluation in Education, 20,* 165-184. http://dx.doi.org/10.1007/s11092-008-9053-z

Thomson, S. (2008, February). International league: Australia's standing in international tests. *Teacher.* Retrieved from http://works.bepress.com/sue_thomson/36

Thomson, S., De Bortoli, L., Nicholas, M., Hillman, K., & Buckley, S. (2010). *Challenges for Australian education: Results from PISA 2009*. Camberwell, Victoria: Australian Council for Educational Research. Retrieved from http://www.acer.edu.au/documents/PISA-Report-2009.pdf

Thomson, S., De Bortoli, L., & Buckley, S. (2013). *PISA in brief: Highlights from the full Australian report: PISA 2012: How Australia measures up*. Camberwell, Victoria: Australian Council for Educational Research. Retrieved from http://www.acer.edu.au/documents/PISA-2012-In-Brief.pdf

Thomson, S., Hillman, K., Wernert, N., Schmid, M., Buckley, S., & Munene, A. (2012). *Highlights from TIMSS & PIRLS 2011 from Australia's perspective.* Camberwell, Victoria: Australian Council for Educational Research. Retrieved from http://www.acer.edu.au/documents/TIMSS-PIRLS_Australian-Highlights.pdf

Toppo, G. (2009). Literacy study: 1 in 7 US adults are unable to read this story. *USA Today.* Retrieved from http://www.usatoday.com/news/education/2009-01-08-adult-literacy_N.htm

U.S. Department of Education, Office of Policy Planning and Innovation. (2003). *Meeting the highly qualified teachers challenge: The Secretary's second annual report on teacher quality.* Washington, DC.

Victorian Government. (2005). *The Seven Principles of Highly Effective Professional Learning*. Melbourne, Vic: Department of Education and Training.

Walsh, K. (2006). *Teacher education: Coming up empty*. Retrieved from www.nctg.org/p/publications/docs/Teacher_Education_fwd_20080316034429.pdf

Wilson, S.M., Floden, R.E., & Ferrini-Mundy. (2001). *Teacher preparation research: Current knowledge, gaps, and recommendations. An executive summary of the research report.* Washington, DC: Center for the Study of Teaching and Policy, University of Washington.

Wong, H.K. (2004). Induction programs that keep new teachers teaching and improving. *NASSP Bulletin, 88*(638), 41-58. http://dx.doi.org/10.1177/019263650408863804

Yamamoto, Y. & Holloway, S.D. (2010). Parental expectations and children's academic performance in sociocultural context. *Educational Psychology Review, 22*, 189-214. doi: 10.1007/s10648-101-9121-z

Yeung, A.S. (2011). Student self-concept and effort: Gender and grade differences. *Educational Psychology, 31*, 749-772. http://dx.doi.org/10.1080/01443410.2011.608487

Zimpher, N.L., & Rieger, S.R. (2001). Mentoring teachers: What are the issues? *Theory into Practice, 27*(3), 175-182. http://dx.doi.org/10.1080/00405848809543348