

Investing in classroom teaching and learning resources

**Access and equity in providing classroom teaching
and learning materials in Australian schools**

April 2012

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Foreword

Maree McCaskill, CEO – Australian Publishers Association

Classroom teaching and learning resources are critical for student learning.

Australia's commercial educational publishers play a key role in developing and providing these materials to support the learning of Australian teachers and students.

This report explores a number of questions about providing classroom teaching and learning materials.

- How do Australian schools and teachers provide classroom teaching and learning materials for individual classes and students?
- What are the vertical and horizontal equity features of this provision?
- How does Australia compare with other OECD countries in the provision of classroom teaching and learning materials for individual classrooms, teachers and students?
- How can we support the way that Australia's teachers resource their lessons more effectively?

These are important questions for Australia's educational publishers and for Australia's schools. This is especially the case when our education system is preparing for the implementation of the Australian Curriculum and the introduction of digital education repositories, and as Australia's education publishers support the digital technology revolution.

The research explores how teachers resource lessons, and trends in this resourcing. The study presents a range of findings about the falling investment in classroom-focused resources. It presents a model of Australia's individual teacher 'classroom up' resourcing model, and the equity implications of this model in our private and government school system. The unique role of photocopying in supporting this 'classroom up' model is also reported on in the research. The report finds that fewer resources are being provided to support individual classroom teachers, especially in public schools, compared with other OECD comparator nations.

Australia's educational publishers make a unique contribution to supporting Australian classroom teaching and learning. Australia's educational publishers commission Australian teachers to write both print and digital textbooks and digital supplementary material for Australian students. These materials play a critical role in teacher planning, lesson development and classroom learning support.

Maree McCaskill
April 2012

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1 Executive Summary

Australia's way of funding schools has been described as 'notoriously complex and difficult to understand'. Similar to most OECD countries, Australia does not collect data on investment in classroom teaching and learning materials used by teachers and students in the classroom, so it is difficult to identify the inputs in education that most impact on student outcomes.

There are major differences in how classroom teaching and learning materials differ by level of education (primary and secondary), by sector (government, non-government and high-fee independent schools), by state and by the socioeconomic status of the school and its students. These differences produce great horizontal and vertical inequity in the provision of classroom teaching and learning materials in Australian classrooms.

It is not only the quantity of classroom teaching and learning resources that is critical, but also the way that teachers and students use them.

Nations leading international student achievement evaluations, such as Finland and Korea, and nations with comparable PISA performances, such as the Netherlands, invest in print and digital textbooks and teaching and learning materials to support teaching and student learning in the classroom. They also support their national curriculum through investment in commercially produced textbooks, digital teaching and learning materials, and government-funded digital education repositories.

The research project analysed photocopying in schools, with reference to data collected by Copyright Agency Limited (CAL) and other material published by CAL in its annual reports; it analysed sales of textbooks and teaching and learning materials by Australia's educational publishers and publishers in other countries; it examined financial information in annual school reports; and it explored how teaching and learning materials are produced and provided in countries leading international student achievement evaluations, such as PISA. The report makes a number of critical findings.

1 In Australia, real investment in commercially published classroom teaching and learning materials has been in decline since 2006.

Nationally, schools are purchasing fewer textbooks, literacy and numeracy kits, teaching and learning resources, software and teacher and student reference material. This decline is the result of limited funding for textbooks and teaching and learning materials, and masks great inequities in the provision of classroom teaching and learning resources between and within schools.

2 Australian teachers and schools rely on photocopied materials as a significant component of individual classroom curriculum teaching and learning materials.

CAL conducts annual surveys of photocopying in Australian schools and produces annual reports that have been analysed by the research project. It estimated that Australian schools and teachers copied approximately 907 million pages in 2007–2008. This photocopying was sourced mostly from textbooks, for their students and classes.¹ CAL estimated that 243.06 pages per student were photocopied in 2008–2009 and 234.57 pages were photocopied in 2009–2010. Although there is volatility year to year owing to the way that photocopying data is collected and analysed, school photocopying per student has gradually increased in the period 1988–2010.

¹ See page 41 of the CAL Annual Report 2007–2008 and page 30 of the CAL Annual Report 2008–2009, accessible from www.copyright.com.au.

The huge cost and amount of photocopying in Australian schools reflect a fragmented approach to providing individual classroom teaching and learning resources by Australia's education system. Australian students receive hundreds and hundreds of disconnected photocopied pages from different sources, as the knowledge base for lessons or as activities to be completed in and out of class. However, photocopying provides a number of advantages for teachers in resourcing their lessons and programs. These advantages are outlined in Finding 4.

3 Nations leading international student achievement evaluations invest more than Australia in classroom teaching and learning materials.

In nations leading international measures of student achievement, classroom teaching and learning materials and textbooks are produced and funded at the classroom and teacher level to support the implementation of the national curriculum for students and teachers. In Finland, Japan and Korea, governments provision teaching through specific policies and by funding textbooks and teaching and learning materials that support learning in the national curriculum. The materials are produced by private commercial publishers, and teachers and schools are free to evaluate and select textbooks and teaching and learning materials that best suit their needs. In these nations, publishers are seen as key stakeholders in the development of resources to support learning and curriculum implementation. They are provided access to schools, students and classrooms, and can trial and refine materials to support learning with the assistance of teachers. Lessons are not dominated by slavish adherence to textbooks, but are supported by teaching and learning materials that are seen as important aspects of teaching and learning. These education systems acknowledge the role of textbooks and teaching and learning materials in student achievement and successful pedagogy.

4 Australia has inequitable investment in individual classroom teaching and learning materials.

Teachers and schools see investment in classroom teaching and learning materials as best made at the school level, but the current system is underfunded and reduces teachers' options, especially in the poorer government schools that operate class set teaching and learning materials systems.

5 Individual teachers develop their own classroom teaching and learning resources, and schools own the process of investing in classroom teaching and learning materials.

6 Teachers use a wider variety of teaching and learning materials from an increasing variety of sources to support their teaching and learning and pedagogy in the 21st century.

Increasingly, teachers seek to match the teaching and learning resources to the learning needs of the students in their classes. This shift has been described as learning design, rather than design for learning. Prefabricated resources such as textbooks and commercially produced teaching and learning materials are modified, adapted and augmented by teachers as they are used.

7 More research is needed about teacher planning of teaching, and the links between selection, evaluation, preparation and use of classroom teaching and learning materials and teaching and learning strategies.

8 Individual classroom, teacher and student access to print and digital textbooks and teaching and learning resources and teaching and learning strategies are linked.

Research has shown that there is a relationship between access to teaching and learning resources and the mediation and types of teaching and learning strategies developed by teachers. Restricting and limiting access to teaching and learning resources influences some teachers to limit the types of teaching and learning strategies they utilise.

9 Nations such as Finland, who are leading international measures of student achievement over the long term, provide greater access to teaching and learning materials for their students; and their pedagogy is more structured around textbooks.

10 ICT resources are crowding out spending on other non-digital classroom teaching and learning resources.

Digital learning investment in both hardware and software is occurring without clear evidence that ICT spending increases student achievement. Research does indicate that ICT promotes student interest.

11 The educational publishing market's capacity to build on its strengths in providing high-quality classroom teaching and learning materials (in both print and digital formats) to meet new learning and curriculum needs, and to also overcome current equity challenges, requires new policy settings and support.

The successful implementation of the new national curriculum in Australia will require increased investment in classroom teaching and learning materials.

Data sources for this report are outlined in Appendix 1.

Further information:

Dr Mike Horsley is available for comment on 0427 035 912.

2 Introduction

2.1 The funding system for Australian schools

The funding system for Australian schooling has been described by Dowling as 'notoriously complex and difficult to understand' and 'unhelpfully complex and exceedingly opaque'. Similarly, Dowling's seminal review of Australia's school funding system concluded that it was 'fragmented by level of government (state or federal), type of sector (government or non-government), location (state or territory), accounting approach (cash or accrual) and even time period (financial or calendar year)'. Dowling further concluded 'that members of the general public have no clear idea what individual schools actually receive from both levels of government, or if their income is appropriate to their needs' (Dowling, 2008, p. 147).

Concerns about the current opaque funding system for Australian schools prompted the Federal Minister for Education, on behalf of the Council of Australian Governments, to establish a review of the school funding system in 2010. The final terms of reference of the review included the role of funding in supporting educational outcomes; allocating funding to ensure all students have access to world-class education; funding mechanisms; and accountability and regulation. The context of the review included the introduction of the Australian national curriculum and its impact on school resources, especially the emerging plans to develop a Digital Education Repository of resources, initially named Australian Curriculum Connect, to support this curriculum; the publication of school financial data for the first time on the MySchool website in 2011; debates about the efficacy of the ICSEA measure; controversy over the continued use of the SES formula used to allocate federal funds to schools, inherited from the Coalition government in 2007; and significant new investments in schools undertaken in 2008–2010 through the Digital and Building the Education Revolutions.

In August 2011 the Australian Government published the Review of Funding for Schooling: Paper on Commissioned Research, which reflected on the four reports that had been commissioned by the Review of School Funding as a key component of the Review of School Funding Research. These four research reports were:

- Assessment of current process for targeting of schools funding to disadvantaged students, by the Australian Council for Educational Research (ACER)
- Assessing existing funding models for school in Australia, by Deloitte Access Economics
- Feasibility of a national schooling recurrent resource standard, by The Allen Consulting Group
- Schooling challenges and opportunities, by The Nous Group consortium.

Each of these research reports supported the various conclusions of Dowling.

Although the reports considered the characteristics of different school recurrent, capital and targeted funding models and criteria for assessing these different models, the research reports did not draw links between the characteristics of different school funding models and classroom teaching and learning resources.

One of the reports – the Allen Consulting Group research on the Feasibility of a National Schooling Recurrent Resource Standard (NSRRS) – developed the background case and proposition and potential structure for an NSRRS. However, the NSRRS concept will need to incorporate classroom teaching resources (as is the case in many other countries). So far, the feasibility research project has not

included discussion of classroom teaching and learning resources. The Allen Group report relies strongly upon the W. Norton Grubb (2008) research on how teachers create teaching and learning resources from school input funding.

2.2 The funding system for classroom teaching and learning materials

The current funding system for classroom teaching and learning materials in Australian schools is even more complex, opaque and fragmented than the school funding system that underpins it. The complexity arises because classroom resources are funded differently by state, by sector (government and non-government), by level (primary and secondary) and by the socioeconomic characteristics of the families from which the school students come. The most positive aspect of the entire system for providing classroom teaching and learning resources to Australian teachers and students is that expenditure decisions for most classroom resources (excluding some computer and digital learning hardware) are taken at the school level by the classroom teacher, teaching group or school department. Teachers, groups of teachers and schools collaborate to select the best teaching and learning resources for their students. This process is described in Finding 6 in this report.

2.2.1 Expenditure differences by level of education

A number of reports into primary school funding (Angus, 2004) have shown that Australian primary schools are funded differently from secondary schools, and that funding per primary student is less than that of their secondary counterparts. The data provided in the discussion paper supporting the national review of funding for schools reported that the 2009 Average Government School Recurrent Cost (AGSRC) nationally for primary students totalled \$8380, and for secondary students, \$10 646. A number of other measures of classroom teaching and learning materials expenditure also indicate significant differences between primary and secondary schools.

Data on nominal sales of teaching and learning materials to primary schools is collected and aggregated (nationally and by state) by the Australian Publishers Association (APA), on behalf of Australia's educational publishers. Publishers' nominal sales data for 2009 and 2010 indicate that nominal sales to the primary education market amounted to approximately A\$57 million for each of these years. Total spending in this primary education market also includes a primary booksellers' mark-up of 45%, and sales by non-APA primary publishers. Publishers estimated this figure at approximately A\$15 million in 2009, leading to total estimated market expenditure of A\$98 million in 2009. This total spending conflates expenditure on teaching and learning materials by schools and by parents. Per capita publisher nominal sales spending per primary student in 2009 was A\$28.81 and in 2010, A\$28.70.

It is estimated that 90% of this spending was on literacy and numeracy materials. Literacy materials provide the knowledge and activity sources of many other primary subjects (apart from numeracy). Publications aimed at the school library and the library markets represent the remainder of primary sales. Many different publishers produce different literacy and numeracy series, and teachers and schools select those most appropriate to their students' learning needs.

Publishers' nominal sales data for 2009 indicates that nominal sales to the secondary education market amounted to approximately A\$95 million and in 2010, approximately A\$97 million. Total spending in this secondary education market also includes a secondary booksellers' mark-up of 30% and sales by non-APA secondary publishers. Publishers estimate this figure at approximately A\$15 million in 2009, leading to total estimated market expenditure of approximately A\$152 million in 2009. Similar to primary, this total spending conflates secondary expenditure on teaching and learning materials by schools and by parents. Per capita publisher nominal sales spending per secondary student in 2009 was A\$64 and in 2010, A\$65.22. Secondary spending per student is almost double that of primary per student.

Similar to primary expenditure, teachers, subject departments and schools are responsible for decisions based on the potential of the resource to meet teaching and learning needs. Boards of Studies in each state, the Curriculum Corporation (now Education Services Australia), teacher professional associations, state-based Departments of Education and other school systems also provide a range of teacher support and student learning materials in both print and digital versions, some at little or no cost to teachers, students and schools.

2.2.2 Funding differences by sector

Australia has a diverse school sector, with the majority of Australians attending government schools and a significant proportion, 38%, attending non-government schools. The discussion paper, accompanying the Review of Funding for Schooling, notes that funding for government and non-government schools is shared between the commonwealth and state governments, parents and the community. In relation to the different school sectors, 2007 data showed that nationally in non-government schools parent contributions through fees and charges represented, on average, 36.3% of total school income. Within this non-government sector, however, parent contributions through fees ranged from 51.3% for independent schools to 22.3% for Catholic systemic schools. As such, the importance of the parent contribution is a key factor in the funding of classroom teaching and learning materials. Parent contribution manifests itself in the systems of book list, book hire and class set that schools adopt to provide textbooks and teaching and learning materials specifically for student use.

Schools operating a book-list system provide a list of mostly print, but increasingly digital, student, textbook and teaching and learning material requirements. Parents then contribute through the funding of student print and digital textbooks and teaching and learning materials by direct purchase, giving students at book-list schools continual access to textbooks and teaching and learning materials at home and at school. In some instances intermediaries, such as booksellers, and sometimes the schools themselves, offer purchasing services to assist parents in making this contribution.

Schools operating a book-hire system purchase mostly print, but increasingly digital, student textbooks and teaching and learning requirements from their global budgets. Usually these books are hired yearly to students who then have continual access to them at a small cost met by their parents.

Schools operating a class-set system also purchase mostly print, but increasingly digital, student textbooks and teaching and learning requirements from their global budgets. Usually these resources are stored in the school as class sets, which can be used in class. However, students are unable in many cases to take home these resources, or have continual access to them. The reason that students do not have continual access is because class sets are rotated across classes throughout each week. Digital provision of texts on students' laptops can sometimes provide access to texts at home.

A more comprehensive description is provided in the box on page 11.

Book list

Teachers decide on the books and digital resources to be used for each year level and subject. Final choices are compiled into a book list. Parents purchase the books and digital resources required for the subjects their children are studying. Schools direct (but do not mandate) their students to particular booksellers, as schools usually receive rebates from such suppliers, and for the convenience of accessing all their study needs from one source. This approach also applies to an increasing number of digital textbooks.

Book hire

Teachers decide on the books and digital resources to be used for each year and subject. Schools purchase sufficient numbers for each subject/year level enrolment on a one book-one student basis. Schools will levy an annual 'hire' charge on the parents of each student for the books that are given to the student at the start of the school year and that must be returned to the school at the end of the school year.

Class set

Teachers decide on the book and digital resources to be used for each year and subject. Schools purchase a quantity of books and digital licences for each subject/year level. The numbers they will maintain may be less than the number of students enrolled for the subject as they will rotate the books across a number of different classes for the same subject/year level. The books are provided to the students at the start of a study period and returned at the end of the study period. They remain at the school. Digital resources are usually accessible to students off-site through the schools' learning management systems.

In New South Wales approximately 17% of schools are book-list schools; in Western Australia, approximately 15% of schools are book-list schools; and in Queensland, approximately 5% of schools are book-list schools.² These book-list schools are predominantly the high-fee independent schools. In South Australia, Tasmania and the Australian Capital Territory (ACT) collectively, 33% of schools are book-list schools, reflecting the national average of 35–38% of schools that are book-list schools. The number of book-list schools is closely aligned with the proportion of students attending non-government schools, especially high-fee, independent secondary schools. In Victoria, the book-list model is the dominant model, with almost 100% of secondary schools utilising the book-list model.

In all states except Victoria, book-hire schools are predominantly government and Catholic systemic schools. The textbooks and teaching and learning resources available to students in the various school sectors are markedly different.

Studies in the 1990s showed that book-list schools, through the contribution of parents to the purchase of textbooks and teaching and learning resources, provided on average six times the resources that book-hire (government) schools provided. This issue will be reported on in Finding 4 of this report.

Victorian schools operate a book-list financing and funding system (100% of schools) for expenditure on classroom teaching and learning materials. In secondary schools especially, students (parents) purchase classroom materials from a school-developed book list. Victoria's book-list system in secondary schools means that Victorian students have greater access to classroom teaching and learning materials than secondary students in other states. Even so, school-developed book lists often focus on core subjects, and not every subject will have a textbook or digital resource on the list that is provided to parents. In some cases, book-list schools purchase class sets for elective subjects.

It is important to note that nearly all Australia's prominent high-fee independent schools operate book-list systems, irrespective of state or education level.

² Based on estimates made by Australian educational publishers.

2.2.3 Differences between book/digital list, book/digital hire and book/digital class set

The book-list, book-hire and class-set systems not only reflect the funding differences by school sector, but also influence the funding-system differences by level of education.

Many more primary schools than secondary schools are book-hire and class-set schools. Classroom lessons are resourced in different ways in primary and secondary schools. Both primary and secondary teachers develop their own teaching and learning resources to meet objectives, student learning needs, their pedagogical approach and school context. The process for doing this is quite different between primary and secondary teachers. Primary teachers have less access to structured resourcing through traditional 'textbooks' (except in mathematics/numeracy and with the many literacy and numeracy kits published by educational publishers) as the basis for their flexible planning. Primary publishing increasingly focuses on literacy and numeracy kits and packages, rather than subject textbooks. Secondary teachers have more structured resources as the basis for their flexible planning as textbook resources written for students are published in most subject areas.

2.2.4 Funding differences by state

Currently, each state government funds schools in different ways, using different funding formulae and policies and decision-making processes. With the exception of book-list schools, most schools operating book-hire and class-set systems in each state fund the purchase of textbooks and other learning materials from their global budgets. However, the different funding systems in each state ensure that these global budgets and their ability to fund teaching and learning resources vary significantly.

For example, prior to 2005 in New South Wales government and non-government secondary schools, specific funds were provided by the state government for the purchase of textbooks and teaching and learning materials for all secondary students through a textbook subsidy. Since 2005, in non-government schools in New South Wales, the Average Government Schools Recurrent Cost (ACGSR) was adjusted to include the price of textbooks and teaching and learning materials, and the specific textbook subsidy per student was withdrawn. In the 83% of NSW schools that are book-hire or class-set schools, funds for the purchase of teaching and learning materials and textbooks are sourced from global budgets.

The funding of the school system in each state directly influences the size of the global budgets available for purchases of classroom teaching and learning materials.

The school funding and financing systems of Western Australia, Queensland, Tasmania and South Australia resemble, but do not totally correspond with, that of New South Wales. A key point of difference among schools in the various states is in regard to the extent that schools lend textbooks and teaching and learning materials to students through the book-hire and class-set systems.

2.2.5 Funding differences that reflect the socioeconomic status of schools

The global budget of a school reflects more than the allocations made by state and federal governments. Extra funds can be sourced through levies and fees and funding through the activities of Parents and Citizens groups. The amount of funds raised in this way has a significant impact on global budgets. For example, the Australian Bureau of Statistics (ABS) data shows that voluntary parent contributions to government schools 'amounted to more than A\$400 million in school fees and donations in 2003–4' (ABS Social Trends cat. No. 4102.0, July 2006). The size of a global budget is a significant indicator of the amount of funding from this source for the purchase of teacher and student teaching and learning materials. Since such fees partly reflect the income of the parents, the socioeconomic location of a school will then in part determine the amount of school global-budget funding and, as a result, the ability of the global budget to support the purchase of such resources.

In addition to the normal funding provided to a school by state and federal government formulae and policies, special payments are also made by state and federal governments to eligible schools to ameliorate specific socioeconomic, indigenous, special education and locational disadvantages. For example, the current federal government invested significant funds in low-socioeconomic status schools as part of the National Agreements in Education. A range of national programs, such as the Smarter Schools national partnerships, make it possible for some low-socioeconomic schools to increase spending on classroom teaching and learning resources. These special payments also influence the ability of book-hire and class-set schools to fund teaching and learning resources from their global budgets.

2.2.6 Funding differences between print and digital education resources

State and federal governments have been investing significant funds in digital education resources for a considerable time, culminating in the Digital Education Revolution of the Rudd Government, which originally planned to invest A\$1.2 billion in providing a laptop for each student in Years 9–12. The Digital Education Repository of resources is being developed to support the implementation of the new Australian national curriculum, and each state government has invested in digital education initiatives designed to provide digital teaching and learning hardware and software resources to support student learning, and new 'connected' pedagogies for classroom teachers.

The investments in digital resources (hardware and software) dwarf spending on other classroom teaching and learning resources, such as photocopying, textbooks, library books and other print resources. The impact of this imbalance in providing digital and print resources for students in classrooms will be explored in case studies in this report and in reports from other OECD nations that also provide digital education resources for schools, teachers and students. Australia's educational publishers are also developing many publications aimed at providing classroom activity and knowledge resources for students that can be delivered on the new digital platforms that have been made available to schools as part of the Digital Education Revolution.

However, unlike decisions about textbooks, photocopying and other teaching and learning resources that are made at the teacher, teaching group and school level, the spending and allocation of most funds related to the Digital Education Revolution are centrally determined by the commonwealth, state departments of education and school systems.

The centrality of 'classroom-up' teacher-designed teaching and learning resources has evolved concurrently within the current structure of the educational publishing market, and the provision of commercially produced print and digital textbooks and teaching and learning materials. It is not clear how centralised digital class resources will interact with current classroom-up teacher practice in developing classroom teaching and learning resources that have evolved under the current market, educational publishing and teacher-practice conditions.

This report draws from data on school-determined uses of digital learning resources, including data collected by CAL in its surveys of teacher use of digital learning resources.

The shift towards providing digital education resources, aimed mostly at teachers to support curriculum implementation, and away from student knowledge and activity sources, such as printed materials (like textbooks, worksheets and blackline masters), raises questions about how teachers plan and support their teaching and, most importantly, how teachers mediate and adapt published teaching and learning materials – especially how they mediate the use of print and digital resources. Finding 10 in this report explores these investments in digital classroom teaching and learning materials.

Overall digital delivery, digital content and digital platforms are becoming blurred. From a school's perspective the arrival of iPads, interactive whiteboards and laptops creates demand for digital content for classroom use. School systems, professional associations and publishers are required to invest in platforms to provide digital content. Digital hardware and delivery hardware are driving digital content.

2.3 Some results of the opaque funding system for teaching and learning resources in Australia

The outcome of this fragmented, opaque and complex funding system can be illustrated through an examination of the different access to teaching and learning classroom resources, such as print and digital textbooks, and other non-digital education resources available to students and teachers in different schools, and different school sectors in different states and localities in Australia.

2.3.1 State and sector variation in access

In a Queensland government primary school (book-hire school), a teacher may be allocated A\$800 per class, per year, for the purchase of teaching and learning materials, such as blackline masters, worksheets, knowledge and activity sources, textbooks, consumables and photocopying for the class. Although the school may purchase additional materials, such as literacy series and other materials for the use of an entire year level, funding for class teaching and learning materials of this nature is extremely limited. The school library may also purchase teaching and learning materials for students and teachers, but again, library budgets for spending on student reading materials are also severely limited.

A New South Wales government primary school may not allocate specific teaching and learning material funds to a class and teacher, but may pool all funds for targeted and focused purchases that will be made in response to applications by teachers for resources, which will be considered in light of the school's teaching and learning strategic plan, and staff and parent priorities for funding. (This will be discussed more fully in Finding 5.) Schools following such a funding system often plan carefully and conserve funds for teaching and learning resources to meet anticipated future requirements. Targets for such investment in classroom teaching and learning materials may be NAPLAN-focused teaching and learning materials or materials to support predicted curriculum changes.

Currently, many schools are preparing in this way, conserving resources for the proposed implementation of the Australian National Curriculum in the period 2011–2015.

In a secondary school book-hire or class-set funding system environment, the school funding allocation process may provide funding of A\$1000 per teacher to the subject department in which the teacher is located. The subject department then collaboratively allocates the pooled funds for the purchase of teaching and learning materials for their students. This system provides larger allocations to larger subject departments, such as English and Mathematics, owing to the prominence of these subjects in the curriculum. Subjects deemed more important are often allocated more funding by schools using a book-hire or class-set system to provide teaching and learning and textbook resources for its students and teachers.

2.3.2 Individual students often do not have their own copies of key resources

The current book/digital hire and class-set funding and financing system for teaching and learning materials is characterised by extremely limited funds for the purchase of classroom teaching resources. Overall, this results in a significant shortage of teaching and learning materials for individual students. This is discussed more fully in Finding 1.

2.3.3 Australian teachers spend more time locating and developing teaching and learning resources than teachers in similar OECD countries

As a result of the extremely limited funds provided for student teaching and learning resources, Australian teachers spend more time locating, sourcing, photocopying and developing teaching and learning resources than in planning how to use them. This key aspect of the Australian education system is less prevalent in the practices of countries, such as Finland, Korea, the Netherlands and Japan, and other national education systems leading international student evaluations, such as PISA.

2.3.4 Photocopying dominates the provision of teaching and learning resources in Australian schools

With the exception of Victoria, which largely operates a book/digital list system, photocopying is heavily relied on for the provision of teaching and learning resources in Australian schools. However, a number of Victorian primary schools operate book-hire and class-set systems; in these schools, photocopying is much more pronounced. Much of this photocopying is of textbooks, and reflects the lack of funding for print-based classroom teaching and learning materials. Photocopying is related to book-hire and class-set systems; where teaching and learning resources are less available, photocopying is increased. It also reflects budgeting processes in schools that shift photocopying from departmental and teaching team budgets to school global budgets. Photocopying strongly aligns with the classroom-up teacher development of classroom teaching and learning materials that characterises teacher planning in Australia. The ability of photocopying to provide flexibility for teachers to prepare the most appropriate resources for their classes is an important aspect driving photocopying practices. Many teaching and learning resources provided through digital platforms are photocopied by teachers for student use. Many students do not have teaching and learning materials to take home, reducing teachers' ability to link learning at home and learning in the classroom. Later in this report, data will be provided on photocopying and textbook and teaching and learning material purchases that illustrate the impact of curriculum change during a time of extremely limited funding.

The advent of an Australian curriculum raises serious concerns about the ability of the current funding system to provide teaching and learning materials to support a successful classroom implementation of the Australian curriculum.

2.3.5 Lack of horizontal equity between schools, and vertical equity within schools, in the funding system for student access to teaching and learning resources

Australia's current financing system provides limited horizontal equity between schools. It does not provide equitable spending on classroom teaching and learning materials for Australian students. The funding system for teaching and learning resources expenditures is complex and fragmented, and results in significant horizontal inequity. At the federal level, no funding allocations are provided specifically for expenditure on non-digital teaching and learning materials by teachers, departments and schools, although some of the funding provided to schools by the Commonwealth may eventually be allocated to classroom teaching and learning materials by the decision-making process at the state, school system, district/region, school department, teaching team and classroom level. In regard to vertical equity among students of different grades and ages in a school, there is a lack of such equity between primary and secondary students; and in secondary schools, increased spending on students takes place in the senior years as students prepare for high-stakes assessment for tertiary entrance purposes.

2.4 The role of classroom teaching and learning materials in student learning and achievement

The role of school expenditure and increasing school spending to enhance educational outcomes and student achievement has been the subject of significant controversy and research. In his seminal review of this research, Hanushek (2006) proposed that 'overall resource policies have not led to discernible improvements in student performance ... and that the broader body of evidence provides little support for the input policies that continue to be the most common approach to decision-making'. However, Hanushek's conclusions are primarily based on crude production function analyses that correlate school inputs and revenues such as per pupil expenditures, such as teacher-student ratios, average teachers' salaries, administrative costs, books and materials and other school inputs.³ This finding, however, has been called into question by the equity and adequacy considerations underpinning a wide range of law suits that have challenged American states to provide adequate school financing for all students, where adequacy is defined as 'sufficient resources to ensure an effective opportunity to acquire appropriately specified levels of knowledge and skills' (Guthrie and Rothstein, 2001; King, Swanson and Sweetland, 2005).

In particular, in relation to both print and digital student educational resources, it is not only the quantity of classroom teaching and learning resources that is critical, but also the use to which they are put by teachers and students. More current research (Grubb, 2008) has argued that many resources in schools are complex and compound, in that their use is mediated by other resources. For example, laptops and digital educational resources and an increasing number of interactive whiteboards may be provided, but the impact on student performance and educational outcomes of these resources will be dependent on the way that teachers use them.

Grubb (2008) has argued that money may be necessary to provide a certain level of resources, but resource use is actually constructed in a school by many different individuals. This research has highlighted the number of variables related to pedagogical practices and teacher attitudes that seem to influence student achievement scores (Hattie, 2009). One implication of this approach is that the previous research results, usually derived from production function analysis and focusing on teacher-student ratios and teacher salaries, indicate very little impact of these sorts of resources on student achievement and learning. According to Grubb (2008), the most effective resources are compound, complex and abstract, some of them due to combinations of resources, some of them (such as school climate) embedded in a web of expectation and personal relations within schools, and some (such as streaming and different levels of curriculum) reflecting a complicated mixture of self-selection, curricular and pedagogical practices and teacher demands. Print and digital textbooks and other teaching and learning resources are modified, adapted and customised by teachers to produce classroom teaching and learning materials. This process of resource construction (Grubb 2008) depends on both the level of classroom teaching and learning resource inputs and the ways that teachers turn these inputs into classroom resources that support learning.

Funding inputs are related to the compound, complex and abstract use of the input resources. Input resources must be *constructed* by school leaders and teachers working together, by the kinds of sustained staff development that are the only ways to improve teaching practices. More recently, Kennedy (2010) has argued that in considering teaching quality, it is best to explore the interaction between the way that teacher characteristics and the school, classroom and situation characteristics

³ Production functions correlate common school inputs – such as school resources, family characteristics and teacher quality – with measures of student achievement. Such analysis is based on many assumptions; for example, teacher quality can be measured by salaries or years of experience. Such a methodology cannot explore the different uses of school resources. In any case, the OECD does not collect data on classroom teaching and learning resources. However, studies in the developing world (Farrell and Heynemann 1989; Braslavsky 2006) show that increased funding of classroom teaching and learning resources, such as textbooks, has the greatest impact on student outcomes.

interact to form and structure such practices. In particular, Kennedy argues that the amount of teacher planning time, the quality of the teaching and learning resources and teachers' workloads all interact to influence the teachers' practices and student learning.

This report will provide research on the complex nature of teachers' use of classroom teaching and learning resources and materials, and draw conclusions from the complex nature of their impact on student learning and achievement. Using data from studies in Finland, Australia and the Czech Republic, the report will outline research on how teachers mediate the use of all classroom teaching and learning resources for their students. Restricting the amount of classroom teaching and learning resources restricts not only the extent and quality of teacher mediation of the resources for their students, but also the way that teachers construct the use of the input resources. The report will also highlight the results of previous research that has shown that limiting classroom teaching and learning resources leads to teachers restricting the teaching and learning pedagogies and strategies used in the classroom. This, in turn, has a negative impact on student learning outcomes.

Finding 6 outlines a model for how Australia's teachers provide resources for their classroom teaching and learning. The implications of this model for decisions about system-wide investment in classroom teaching and learning resources will be outlined in Finding 8.

The final finding of the report will highlight the implications of this research on the relationships between classroom teaching and learning resources and student achievement and learning to develop resource priorities for Australian schools.

3 Findings

Finding 1

Real investment in commercially published teaching and learning materials in Australia has been in decline since 2006

What are the sources of classroom teaching and learning materials, and what data is available on this investment?

Classroom teaching and learning materials are provided for students through a variety of sources. One source is the teaching and learning resources produced by commercial educational publishers and purchased by schools through the educational publishing market. Another source is materials produced and distributed by state departments of education, boards of studies and professional teachers' associations, government and non-government organisations in print- and web-based delivery platforms. While some of this teaching and learning material is free, some is purchased by schools via the educational publishing market. Still another source is teacher-produced material that has been prepared for individual classes. Photocopying is a significant means by which teachers and schools provide teaching and learning resources from all three of these sources for their students. For many years Australian teachers have developed an approach in which they use any source to develop resources to support their classroom teaching. Digital content resources – such as software, electronic versions of textbooks, and software and content for interactive whiteboards – have also been developed by commercial and non-commercial publishers to provide classroom teaching and learning materials to schools.

It is difficult to provide data on the quantum of classroom resources provided by commercial and non-commercial producers of classroom teaching and learning materials owing to the lack of formal record-keeping of such procurements.

Although schools have accounting and information systems, these systems do not usually track expenditures on classroom teaching and learning materials. Most principals and education systems do not have visibility of dollar amounts spent on classroom teaching and learning materials because the administration and financial packages that schools use are not developed to capture this data and because, for some schools, the purchasing is done by parents.

As a result, this research will use market data to explore investments in classroom teaching and learning materials. This data has been triangulated with interviews with school principals and a number of case studies involving schools. In this section the research will report on nominal aggregated sales data collected by the APA from its educational publishing members. In the next section, photocopying data collected by CAL has been referred to in order to analyse the investment in classroom teaching and learning materials currently being made in Australian schools⁴.

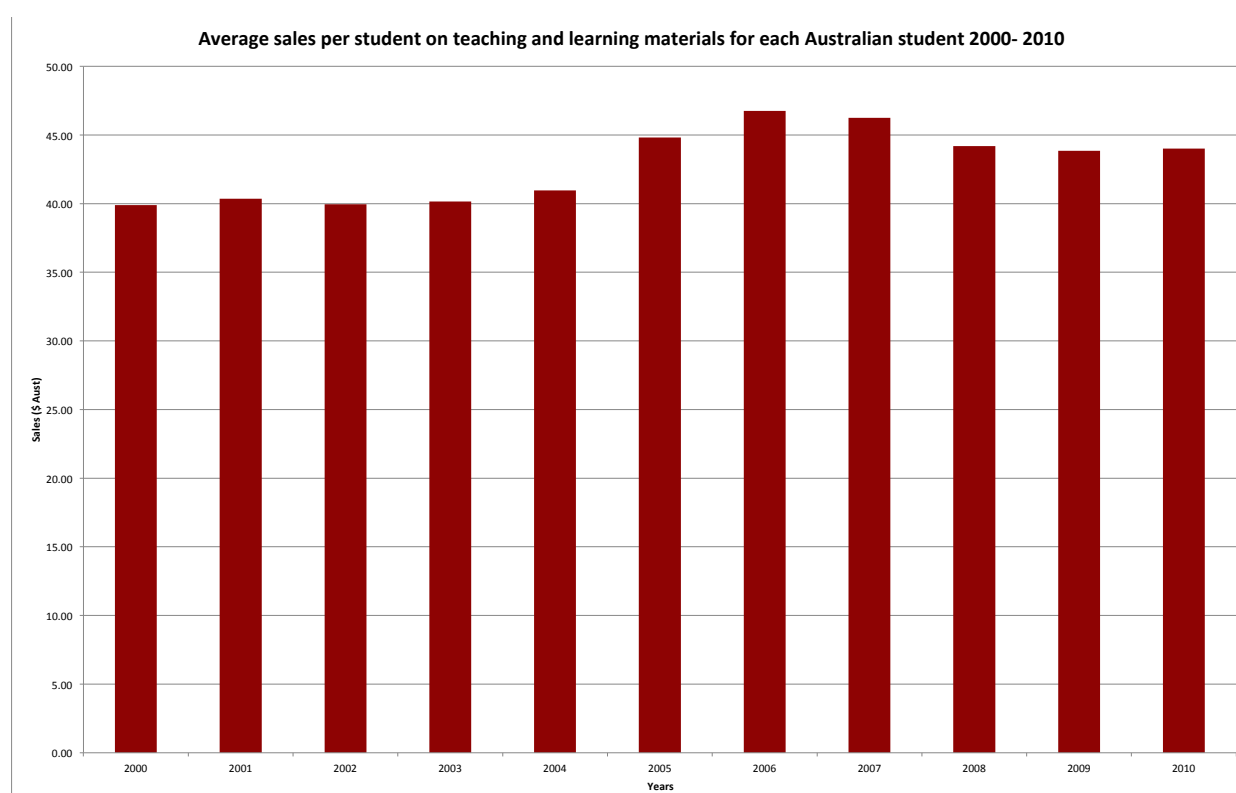
⁴ Estimated copies of annual photocopying in Australian Schools are available from CAL Annual Reports 2007–2008 and 2008–2009 at www.copyright.com.au.

What does data on commercially published classroom teaching and learning materials tell us?

Nominated aggregated sales data from the APA survey of sales of educational materials outlines total market purchases per student on textbooks, literacy and numeracy kits, teaching and learning resources, software and teacher and student reference material. These sales figures do not include estimates for booksellers' mark-ups and estimates for non-APA publishers.⁵

Chart 1 below shows that average aggregated nominal publishers' sales was A\$39.89 per student in 2000, and rose to A\$46.76 in 2006. This rise is the result of secondary curriculum change in Victoria and New South Wales in 2006. Since then, aggregated nominal sales have fallen back to A\$43.85 in 2009 and A\$44.00 in 2010. The pattern during the decade can be described as a slight nominal rise in average spending per student. Chart 1 shows aggregated sales that combine both primary and secondary sales (spending) per student. In a later section of this report this average will be compared with other selected OECD countries.

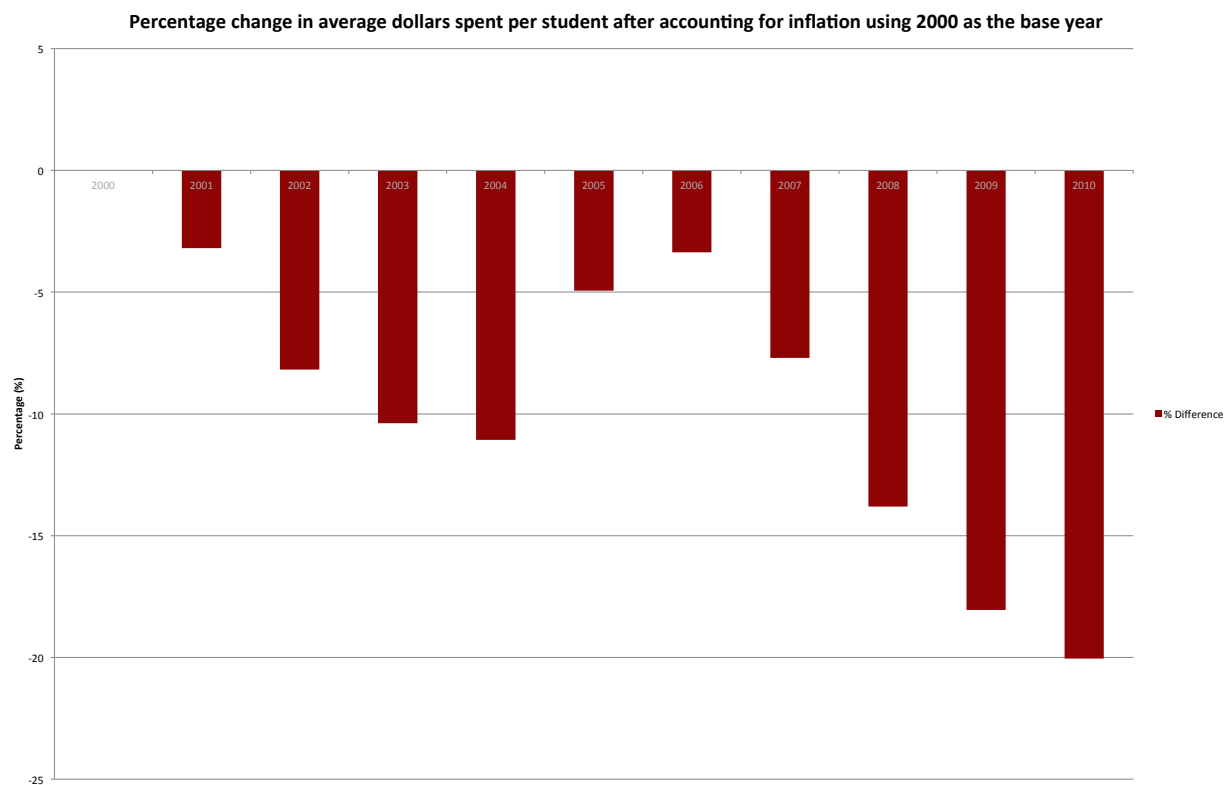
Chart 1 Aggregated nominal sales per student on commercial teaching and learning materials 2000–2010



The figures in Chart 1 are nominal and need to be adjusted for inflation. Using a deflator with 2000 as a base, Chart 2 on page 20 shows that inflation has reduced the real value of sales of commercially published teaching and learning materials by more than 15% from 2000 to 2010.

⁵ The APA records an aggregation of invoiced sales of most, but not all, the publishing market. The total figures do not include bookseller profit or mark-up to RRP. Thus, the customer base of teachers/students/schools pays a combination of the APA sales, plus the bookseller mark-up. It is estimated that is about 30% for secondary and 15% for primary schools. APA figures neither include specific library books, nor school or parent purchased subscriptions to education software, such as Mathletics and MathsMate Computer Tutor. There is also a thriving second-hand market in the secondary area, especially in book-list schools, which represents expenditure on textbooks and teaching and learning materials that is not included in the APA figures. (See Appendix 3.)

Chart 2 Real average aggregated sales per student decline 2000-2010



What are the per student sales (and spending) differences by sector and state?

The average per student nominal figures presented in Chart 1 mask the educational system financing and funding differences outlined in the introduction.

There is a significant difference between primary and secondary spending, and significant differences between states.

Chart 3 on page 21 shows that secondary average nominal aggregated sales (spending) per student were approximately 50% greater than primary sales (spending) per student over the decade. Furthermore, while average nominal sales (spending) per student has been rising slightly in secondary schools, it has been falling in primary schools. The adjusted value of sales (spending) on primary teaching and learning materials per student has fallen by more than 25% between 2000 and 2010.

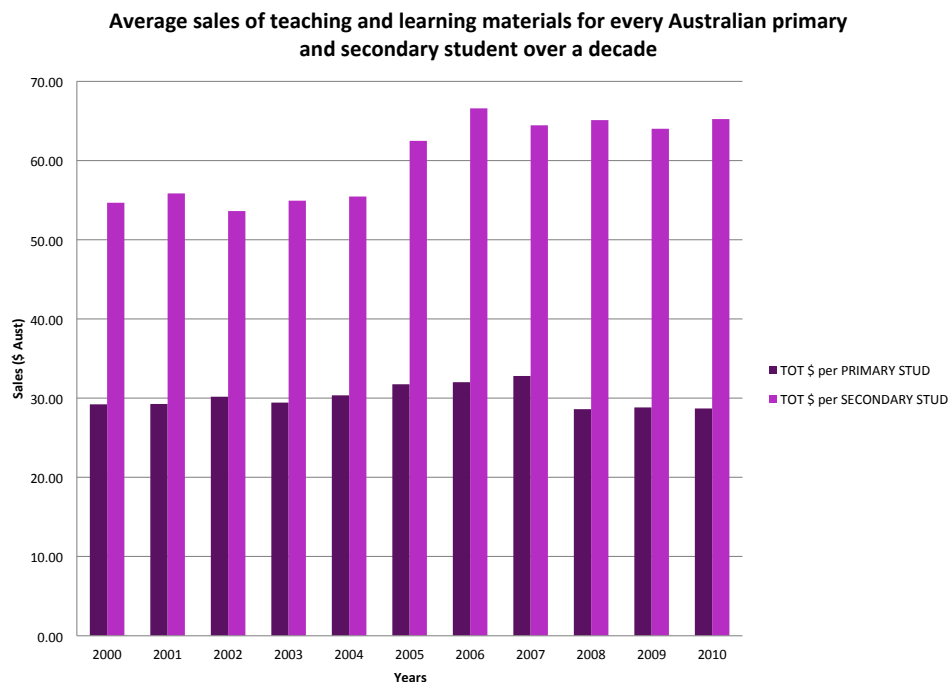
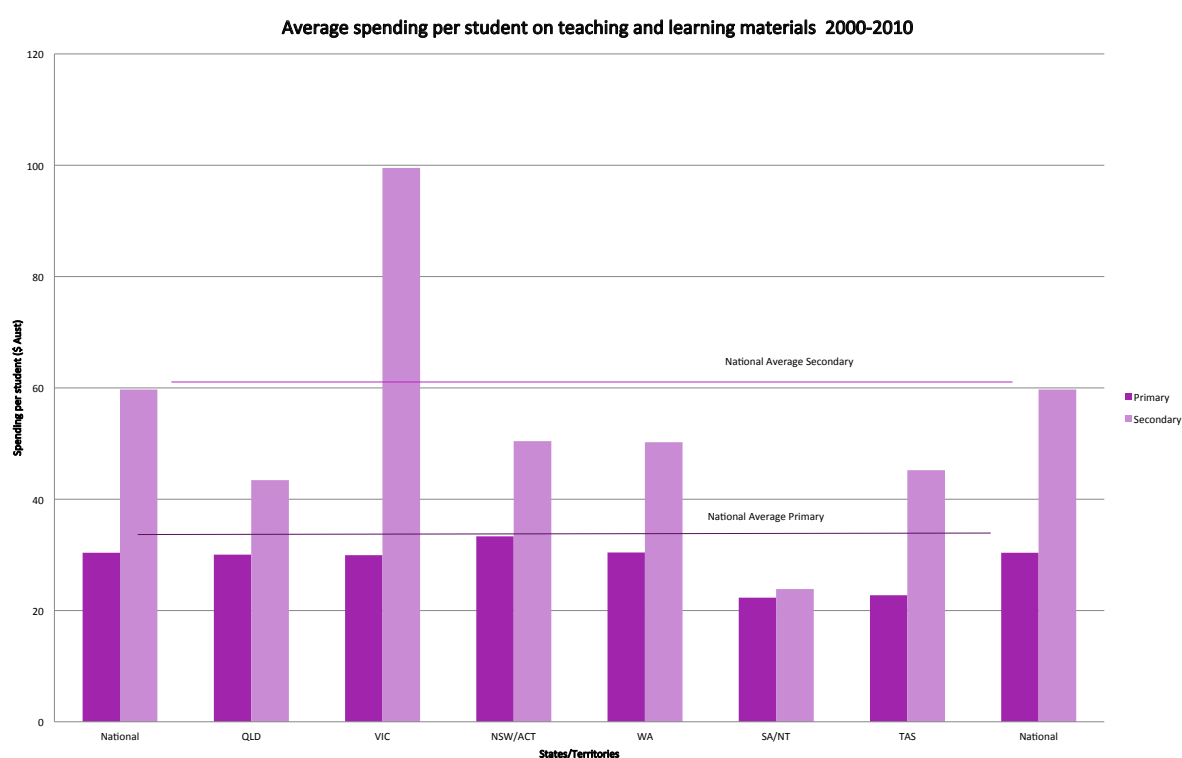
Chart 3 Comparing nominal primary and secondary Australian spending per student

Chart 4 on page 22 outlines the state variations, by primary and secondary schools, by nominal per student sales (spending). The impact of the book-list system in Victoria for financing and funding such purchases can be seen in the way that Victorian students have access to more classroom commercially published print and digital teaching and learning materials than students in other states. This is because parents contribute to spending on teaching and learning materials in almost all Victorian secondary schools and many primary schools, whereas in other states in book-hire and class-set schools, parents do not directly contribute in a major way to spending on classroom teaching and learning materials. The data also shows that students from Tasmania, South Australia and the Northern Territory had the least access to classroom teaching and learning materials from commercially published sources from 2000 to 2010.

Chart 4 State by state primary and secondary sales per student 2000–2010

Another way of exploring these differences between primary and secondary and by state is to examine the following tables that show nominal sales (spending) per student per state in 2007, 2008, 2009 and 2010.

Table 1 shows that nominal sales per student had fallen to A\$28.70 per primary student in 2010. State variations in primary aggregated nominal sales are also illustrated.

Table 1 APA nominal sales data per student enrolment 2007–2010 primary

Australian state/territory	Nominal primary sales per student (A\$) 2007	Nominal primary sales per student (A\$) 2008	Nominal primary sales per student (A\$) 2009	Nominal primary sales per student (A\$) 2010
QLD	34.26	25.82	24.09	26.17
NSW/ACT	36.11	32.43	31.96	31.97
WA	33.93	32.86	37.87	33.81
VIC	31.35	28.87	27.77	27.00
TAS	23.13	21.53	24.37	25.02
SA/NT	22.15	18.47	19.35	20.60
Total Australia	32.79	28.63	28.81	28.70

Table 2 shows that nominal aggregated sales per student had risen slightly to A\$65.22 per secondary student in 2010. State variations in secondary aggregated nominal sales are also illustrated.

Table 2 APA nominal sales data per student enrolment 2007–2010 secondary

Australian state/territory	Nominal secondary sales per student (A\$) 2007	Nominal secondary sales per student (A\$) 2008	Nominal secondary sales per student (A\$) 2009	Nominal secondary sales per student (A\$) 2010
QLD	45.65	44.26	46.33	37.80
NSW/ACT	45.33	48.71	48.08	49.60
WA	57.84	60.69	69.64	72.45
VIC	122.43	118.45	113.35	120.79
TAS	29.52	31.06	33.02	29.35
SA/NT	23.88	22.04	18.87	21.27
Total Australia	64.46	65.11	64.00	65.22

The tables provide evidence of the marked differences between states in the amount of commercially produced classroom teaching and learning materials provided to students in each Australian state.

The data shows the difference between secondary book-list schools, where parent contributions to purchasing means that Victorian secondary school students have access to classroom teaching and learning resources to a much greater extent than students in schools operating book-hire and class-sets systems in the other states.

The increase in spending for Western Australia 2007–2009 is overstated. Western Australia undertook curriculum change in 2007–2009 in secondary education, which contributed to some proportion of the increase in nominal sales. Prior to 2007, most booksellers were state-based, so the nominal sales figures reflected state spending. However, in 2007 a large Western Australian bookseller purchased a leading Victorian bookseller, and publishers' sales data for Western Australia was conflated as a result of attributing publishers' Victorian sales to a Western Australian bookseller. The inclusion of the ACT in the sales data collected for New South Wales also inflates sales in New South Wales, as a result of the way that teaching and learning materials are financed in the ACT.

The tables also allow comparison with other OECD countries. As part of this research project, similar publishers' sales data and other expenditure data was developed for other selected OECD nations. These can be compared with this Australian data.

Can this aggregated nominal sales data be triangulated?

A number of small group discussions with school principals representing state schools with class-set, book-hire and book-list systems were held in late 2009. These principals were asked how much was spent on classroom teaching and learning materials in their schools. In response, they offered average 'ball park' figures. These figures included:

- approximately A\$90 per student in 2009 on teaching and learning materials, excluding ICT (Victorian government secondary principal)
- approximately A\$15 per student this year (NSW government primary principal)
- about A\$20 per student without any ICT spending for 2009 (Queensland government primary principal)
- about A\$35 per student this year (NSW government secondary principal).

These figures provided did not include photocopying and photocopying budgets in regard to 'teaching and learning materials'. In addition, analysis of school annual reports that report data on spending on teaching and learning resources, such as in New South Wales, also correlates with the spending data reported in this section. Finding 4 also provides data from the Australian Scholarships Group (2007) that also confirms the data provided in this section. Analysis of book lists provided to parents by book-list schools closely correlates with the data reported by the Australian Scholarship Group in Finding 4.

Why is the investment in commercially published print and digital classroom resources falling?

This falling investment in commercially published classroom teaching and learning materials can be interpreted in relation to a number of issues impacting on the way that teachers and schools provide classroom teaching and learning materials. These issues are provided below.

Limited funds for the purchase of such materials

Global budgets in the book hire and class set financing systems are under pressure as other funding priorities arise.

In particular, education systems have prioritised spending on digital education hardware and professional development (the APA data includes commercially produced software), which also are making major claims on global budgets.

The next section in this report explores the ubiquitous nature of photocopying in schools as a means of providing classroom teaching and learning resources.

Changes in teaching and learning and pedagogy

Traditionally, Australian teachers depend much less on textbooks than teachers in other OECD nations, and are more likely to prepare their own classroom teaching and learning materials from multiple sources. This approach is very much encouraged in teacher education. In addition, Australian primary publishing is now almost totally focused on the development of literacy and numeracy kits and support materials, rather than in publishing what once were termed 'textbooks' for each subject. For primary and secondary teachers, photocopying provides great flexibility in delivering student-centred pedagogy. Section four of this report further explores pedagogy and the use of classroom teaching and learning materials.

Changing investment priority to ICT

Discussions with principals conducted as part of this research project revealed there is a strong trend across schools to invest more in ICT infrastructure, often with the assistance of parents. In some cases, principals have indicated they are moving away from printed materials to provide better access for students to information from the Internet. However, the majority of principals reported that 'there is still a belief in both print and digital textbooks', but that 'ICT resources are perceived to be cheaper'.

What are the consequences of this falling sales and spending?

A real decline in investment in commercially produced teaching and learning materials presents a number of challenges to the provision of meaningful and relevant classroom resources.

One of the main challenges is inequity. Students in secondary and primary book-list schools have access to the latest textbooks, kits and classroom teaching and learning materials, digital learning resources (both hardware and software which is included in the APA data) and, dissimilar to students from class-set schools, have access to these materials on a take-home basis. This challenge has a flow-on effect in limiting pedagogy and in setting homework and school

assignments and assessment tasks that are completed outside of school. The results mean that about 60% of Australian students do not have continual access to materials as they cannot take books or parts of teaching and learning kits home. This is in contrast to other OECD nations.

A key consequence is that book-hire and class-set schools have an aging stock of materials. In some cases, this stock includes outdated content and pedagogy, and does not meet the learning needs of current students.

Can teachers construct even more classroom teaching and learning resources from the increasingly limited classroom resource inputs available in many schools? Furthermore, limited teacher lesson planning and programming time interact to directly influence the quality of classroom teaching and learning resources constructed by teachers. Kennedy (2010) has argued that these key factors of school life and teaching practice directly influence the quality of teaching.

Australian publishers report that, in discussing the pending implementation of the Australian Curriculum with some schools, these schools are not yet sure they will have the funds to purchase new teaching and learning resources when they have to implement the Australian Curriculum. Comments similar to the following statement from a Queensland Head of a Science faculty are common: 'It depends upon the principal. He may allocate funds to other departments first and we will not be able to purchase new texts until we get our funding. We will have to implement the new curriculum using the old texts that we have.'

This creates increased pressure for teachers to produce their own classroom teaching and learning materials, in many cases by photocopying, rather than modify and match existing materials for their classes.

Another critical consequence created by this fall in investment is the impact on access to other sources of teaching and learning materials, in particular photocopying. Instead of taking books and parts of teaching and learning kits home, Australian students take home hundreds of photocopied pages of knowledge sources and activities from textbooks, collages, websites, teachers' notes and teaching kits that constitute a veritable wall of loose sheets of paper, most of it copied from textbooks.

What do international comparisons show?

Finding 3 provides more comparisons. Finnish data indicates that, in 2007, Finnish local authorities (who fund schools) provided on average the equivalent of approximately A\$175 (at 2007 exchange rates) per student, which was spent on teaching and learning materials (excluding ICT) for students in the compulsory years of school.⁶ Almost all Finnish students were provided with books, to which they had continual access, for each subject. In the United States, in 2007, the Market Data Retrieval (MDR) group calculated that US states (including the state of New York) spent approximately US\$248 per student on instructional materials, such as classroom teaching and learning resources like textbooks, textbook repairs, workbooks, magazines, newspaper subscriptions, and on teaching supplies such as chalk, whiteboard markers and crayons.

⁶ Included is software and educational media supplies. Excluded are IT, computer and other media hardware.

Finding 2

Australian teachers and schools use photocopied materials as a significant component of curriculum teaching and learning materials

Photocopying in Australian schools is pervasive. Individual teachers resource their classroom lessons from multiple sources, and often photocopy or print them. This section of the report provides data on the level of photocopying in Australian schools by primary and secondary, state and school sector.

CAL conducts annual surveys of photocopying in Australian schools. It produces annual reports that have been analysed by the research project. CAL estimated that Australian schools and teachers copied approximately 907 million pages in 2007–2008. This photocopying was sourced mostly from textbooks, for their students and classes⁷. It also estimated that 243.06 pages per student were photocopied in 2008–2009, and 234.57 pages were photocopied in 2009–2010.

To estimate school photocopying, CAL conducts surveys of photocopying and digital printing in Australian schools. The details of the way the survey is conducted is explained in the note on page 27.

As an example of the survey data, CAL estimated that in New South Wales, South Australia, Tasmania and the Northern Territory over 445 million pages were photocopied in 2006. This equates to 295 pages per primary and secondary student in those states for that year.

In 2008–2009 the CAL survey estimated that in Victoria, Western Australia, Queensland and the ACT, more than 210 pages per student were photocopied in those states in that year.

CAL survey data for 2008–2009 have been used to develop an estimate that primary schools photocopied 215.74 pages per student. Secondary schools photocopied 280.07 pages per student.

CAL survey data for 2009–2010 have been used to develop an estimate that primary schools photocopied 206.11 pages per student. Secondary schools photocopied 272.60 pages per student.

Estimated pages photocopied per student in schools fell slightly from 243.06 in 2008–2009 to 234.57 in 2009–2010. Although there is volatility year to year owing to the way that photocopying data is collected and analysed, school photocopying per student has gradually increased in the period 1988–2010 and remains a critical factor in how teachers resource their classroom teaching and learning.

A note on CAL surveying

Each year CAL conducts a survey of photocopying in Australian primary and secondary schools.

This photocopying survey is used to estimate the quantum of school photocopying in Australia. The quantum of photocopying is an important aspect of the statutory licensing scheme established in the *Copyright Act* of 1968. This scheme and legislation allow educational institutions to photocopy for educational purposes. The survey of photocopying in schools is undertaken to provide information to CAL about the volume of copying and the type of material copied in school systems, and to provide information on which CAL can distribute school payments to the appropriate copyright owners.

These licence fees are returned to copyright owners, such as authors and publishers of the photocopied works. In 2008 alone, school systems and schools paid A\$44 million to CAL in licence fees for photocopying. It is currently estimated that, in 2011, \$16 per student will be paid by school systems in licence fees for photocopying.

⁷ See page 41 of the CAL Annual Report 2007–2008 and page 30 of the CAL Annual Report 2008–2009, both of which are accessible from www.copyright.com.au.

The photocopying survey is important as it identifies the titles, publishers and authors of the photocopied works, the amount of photocopying, and what kinds of works are copied (by type, such as books, newspapers, journals or Internet; and by content, such as chapter, art, poem and short story).

The survey is conducted for a single term in 180 schools in half the states each year. An individual school could expect to be involved in the survey no more than once in every eight years; although, in practice, this may be no more than once in a considerably longer period. In 2008–2009 the survey process was enhanced and refined.

The survey is structured so that the size, location and structure of all the school systems – government, independent and private – are fully represented.

Once the total photocopies made of copyright works during the survey has been determined across all sectors and systems and all surveyed states, CAL and the schools' representatives have historically settled a rate per student, by either agreement on a flat rate or a formula based on the estimated use per student and the total enrolment numbers of each state, sector and system. This survey methodology and method of calculating a rate have been considered by Australia's Copyright Tribunal and other courts in a number of cases over the last two decades.

The primary reasons for this volume of photocopying include:

- The limited funds available for the purchase of print and digital textbooks and teaching and learning materials mean that teachers need to photocopy materials they are unable to provide to every student.
- The need for teachers to be able to flexibly resource their lessons to meet the learning needs of their students means that they prepare their own materials for their classes.
- The way that school expenditure processes operate to allocate funds from departmental and global budgets. In some cases, photocopying may shift the cost of provision of resources for a teacher's classes from that teacher's departmental budget to the school global budget as textbooks and other teaching and learning resources are sourced from a departmental budget and, in some schools, photocopying from a global budget.

Few studies have explored the photocopying behaviour of teachers (Horsley, 2007). Even in book-list schools, with high access to textbooks and other teacher resources, teachers often supplement their teaching and learning resources by photocopying knowledge and information sources and activities from other texts on the market, and provide a greater variety of teaching and learning strategies. Homework sheets form a significant percentage of primary school photocopying, with an average of one homework sheet per student per week (Richardson and Horsley, 2011).

Some schools and teachers produce photocopied booklets by collecting a wide range of resources from assorted texts and other sources that are structured and organised to meet the needs of the students at the school. This is a common method of providing classroom teaching and learning resources that is cost-effective and relevant in Australia's government schools in some subject areas.

Using photocopied sheets to deliver resources for classes is a well-established cultural practice in Australian teaching. Many teachers welcome this way of providing classroom teaching and learning resources because they can prepare their own notes, knowledge sources and activities where there are gaps in classroom teaching and learning resources, or where the budgetary resources of the school are inadequate. In addition, preparing resources in this way allows teachers to develop classroom resources that are adapted, developed and customised for the learning needs of a class. Furthermore, each teacher usually develops their own specific classroom resources, shaped by their own access to and knowledge of the available resource sources. A key source of the available resources that teachers are

aware of includes the commercially produced print and digital materials developed by publishers. These constitute a core of school input resources that the majority of teachers deploy in constructing their classroom teaching and learning resources.

CAL estimated school photocopying in its annual reports up until 2009. This data does not identify the book-list, book-hire or class-set nature of the financing system of schools and its impact on the photocopying behaviour of private and government schools.

The national averages estimated in CAL annual reports masks significant school (primary and secondary), school system and state variations. The data samples collected by CAL in its rolling survey in different states is not large enough on a state-by-state and school-type basis to produce meaningful tables on state-by-state and school-system comparison. However, CAL does informally acknowledge that its historical survey data indicates a lower use of photocopied materials in Victoria, the state operating the most comprehensive book-list system. This indicates that a stronger provision of commercially produced print and digital textbooks mitigates the need for teachers to produce all of their own classroom resources and reduces photocopying. Planning time is therefore less focused on producing classroom teaching and learning resources.

What are the costs of photocopying?

1 The shelf-life of photocopying compared with other classroom teaching and learning resources

Very little photocopied material has any shelf-life or can be used over and over in comparison to textbooks and other printed teaching and learning materials. Accordingly, photocopying expenditure does not buy an enduring asset. For example, if teachers in 2006 had reduced their photocopying by 50% from 295 pages to 148 pages per student, each classroom teacher could, over a three-year period, purchase approximately \$1350 worth ($148 \times 10 \text{ cents per page} \times 30 \text{ students} \times 3 \text{ years}$) of long-life educational materials for students. Of course, how many books would \$1350 purchase? Perhaps in a class-set school funding system the teacher may afford two class sets of textbooks, perhaps covering two subjects, every two years. However, the opportunity cost of these longer-life materials may be the reduction of teachers' ability to pick, choose and copy classroom resources from a number of sources – perhaps even 148 different specially designed worksheets adapted for the teacher's class. In 2009–2010 Australian teachers were photocopying 234.57 pages per student. A reduction of this photocopying by half would have reduced photocopying by 122 pages and each classroom teacher could, over a three-year period, purchase approximately \$1098 worth ($122 \times 10 \text{ cents per page} \times 30 \text{ students} \times 3 \text{ years}$) of long-life educational material for their students.

2 Fragmentation

The large amount of photocopying in Australian schools reflects a fragmented approach by teachers and teaching groups to providing teaching and learning resources. The common practice of each teacher producing their own classroom teaching resources has accentuated fragmentation in the ways that different subjects are taught and resourced. Australian students receive hundreds of disconnected photocopied pages from different sources, as the knowledge base for lessons or as activities to be completed in and out of class. Parents often despair of the large volume of crumpled photocopied pages covering the floors of their children's bedrooms. Some schools have moved to providing electronic textbooks and assessment tasks online to reduce the amount of photocopied pages that students transport between home and school.

3 Teacher planning time and effort in producing and copying classroom resources, the opportunity cost of teachers photocopying

The opportunity cost of the current volume of photocopying is simply enormous in terms of teacher planning and administrative school time. Even more importantly, the wide use of photocopying to provide classroom knowledge and activity sources for students means that Australian teachers spend

considerable planning time identifying, locating and preparing photocopied knowledge and activity sources for their classes, and then physically copying them. The opportunity cost of this classroom resource provision is planning the use of the resources in the classroom. It appears that Australian teachers may spend time preparing and copying resources, rather than planning their use with students. Increasingly, teachers now download knowledge resources from the Internet, produce notes and knowledge sources for their students and, in many cases, print them at home using their personal printers. Research on these processes and teacher investment in their own classroom materials are discussed in other sections of this report.

The 2007–2008 CAL Annual Report revealed that approximately 900 million pages were photocopied in schools in Australia during this period.⁸ Let us assume that teachers undertake this photocopying. (In some schools, especially large secondary and book-list schools, administrative staff and teaching assistants may undertake some of the photocopying.) Also, in many primary schools, teachers' aides complete significant photocopying. The teachers' aides' contribution to learning and development is reduced when they are removed from classroom support to make photocopies. We assume that teachers could possibly copy about 350 pages per hour as most teacher photocopying is short run and requires preparation, printing digital sources, folding textbooks or physically manipulating other information and activity sources prior to photocopying. We also assume that teachers work a 6.5-hour school day. Dividing the approximate 900 million photocopies by 350 pages per hour, multiplied by 6.5 hours – that is, 900 million divided by (350×6.5) – means that notionally 395 604 teacher days are spent photocopying each year. Assuming that 40 weeks of schooling occur per year, teachers spend 195 days at school each year. Dividing the number of teacher days spent photocopying (395 604) by the number of teacher days at school (195), ***we can calculate that the equivalent of 2029 teacher years were spent photocopying in 2007–2008.*** This analysis suggests that photocopying requires the equivalent of almost 2000 full-time teachers across Australia spending their entire teaching year on full-time photocopying. The teacher salary opportunity cost of photocopying can be estimated by assuming that an average teachers' salary is approximately \$70 000 per annum. At this salary estimate the opportunity cost of 2000 teachers photocopying for the year is approximately A\$140 million. In the 2009–2010 period, 234.57 pages were photocopied for approximately 3.497 million students, providing an estimated total of 820 million photocopied pages. Using the same assumptions as in the 2007–2008 calculation, we can assume that the teacher salary opportunity cost of photocopying was A\$127.4 million, assuming teacher salaries remained constant (at our estimate of \$70 000 per annum) for the 2007–2010 period.

4 The real costs of photocopying

If education systems accurately tracked the real cost of photocopying from textbooks and teaching and learning materials, it may be discovered it is cheaper to purchase most of these materials outright. Schools pay a collaboratively negotiated annual fee per student to CAL, with different amounts for primary and secondary schools. This statutory licence payment is paid by each state and territory government on behalf of schools. These payments are then distributed to copyright owners on the basis of statistical samplings of schools, undertaken independently, but the under auspices, of CAL. Under this system, schools pay the same amount per student, whether they photocopy huge volumes of material or very little. No school is separately charged for the amount of photocopying they actually do in any one year. This allows some less-affluent schools to replace the purchase of teaching and learning materials with photocopying. One result of the underfunding of curriculum teaching and learning materials is the promotion of such staggering amounts of photocopying.

The physical cost of photocopying in schools can be estimated by calculating a notional physical cost per page covering the capital investment in and leasing costs of copiers, depreciation, electricity costs, paper and servicing. This is shown in Table 3.

⁸ See page 41 of the CAL Annual Report, accessible from www.copyright.com.au/assets/documents/annualreport0708.pdf.

Table 3 *Estimates of the total physical costs of photocopying⁹*

Year	Estimated photocopying	Estimated photocopying pages per student	Total cost at 5c per page/ cost per student	Total cost at 10c per page/cost per student
2009–2010	820 million pages copied for school students	234.57 pages	\$41. million/ \$11.72 per student	\$82. million/ \$23.44 per student

At 10 cents per page the 2010 estimated physical cost to Australian schools of school photocopying is estimated to be A\$82 million. Once statutory licences are included, the cost of photocopying is approaching the cost of APA sales of all educational published materials.

One of the reasons advanced for extensive photocopying per student, especially in secondary schools, is that photocopying is allocated to the whole school budget, rather than to specific subject departmental budgets. With limited funds for each subject department deployed to the purchase of textbooks and other teaching and learning resources, photocopying is a way of providing additional classroom teaching resources from the school budget. To manage rising photocopying budgets, however, principals are increasingly pursuing a range of photocopying-limiting strategies. These include placing page limits per annum on teacher photocopying and/or adding photocopying expenses to faculty and departmental budgets. Both limiting strategies reduce the methods that teachers employ to develop specific and relevant classroom teaching and learning resources to support their lessons. One response by teachers is to scan materials and use school and home printers to print them: a quasi photocopying process.

What are the advantages of photocopying as a means of providing a significant proportion of classroom teaching and learning resources?

Australian teachers' unique photocopying practices align with the ways in which Australian teachers use multiple sources to prepare lessons. The ease and speed of photocopying to provide classroom teaching and learning materials for a class represent significant teacher autonomy and flexibility. From a teacher's perspective, making and using photocopied worksheets in a class have significant advantages over using commercially produced textbooks, learning objects or digital education resources produced to support a curriculum or teaching approach. Teachers can minimise the costs of developing classroom resources, and make the greatest use of limited planning time. They also avoid the centralised selection of a limited number of teaching and learning resources, and maximise their own flexibility. In understanding photocopying we must be careful to explore the cost–benefit aspects of photocopying from a teacher's perspective. The cost of photocopying needs to be related to the value of the teachers and schools doing the photocopying. Teachers often make photocopied books similar to 'course packs' derived from copying material from a range of commercially published materials. It is the photocopier and statutory licence system that allows teachers to achieve this benefit at a reduced cost.

Photocopying data demonstrates the impact of curriculum change on photocopying. Generally, photocopying increases during periods of curriculum change. This is especially the case in secondary schools where changes in curriculum typically occur in a greater range of subjects, which have specialist teachers. The introduction of new primary subjects in the proposed Australian Curriculum in essentially new subject configurations could potentially have major consequences for both photocopying and the resourcing of teaching and learning. The impact may be that primary photocopying rapidly expands so that it approaches secondary levels, increasing pressure on primary school budgets.

⁹ Estimate based on multiplying total pages photocopied per student 234.57 by number FTE students in 2010, 3.497 million.

Finding 3

Australian primary and secondary schools make a smaller investment per student in commercially published textbooks, literacy and numeracy kits, teacher and student reference material and educational software than schools in other comparable countries, especially in those countries leading international student achievement evaluations

What is the investment in classroom teaching and learning materials in other selected OECD countries?

The educational publishers in most countries collect similar nominal sales data to that gathered by the APA. This international sales data has been accessed to construct a limited comparative analysis of the purchasing of teaching and learning materials and textbooks.

These comparisons reveal average nominal sales (spending) per student in a range of OECD nations in 2006:¹⁰

- In Denmark publisher sales data showed that €60 per primary and secondary student were expended on commercial textbooks and teaching and learning materials that were purchased from Danish educational publishers.
- In Sweden sales data showed that €65 per secondary student being spent.
- In France sales data show that €90–100 per secondary student was spent on commercially published teaching and learning materials.

In making these comparisons a number of assumptions are made. The number of books sold per country is assumed to be the same, so the figures reflect variations in spending rather than variations in the number of books purchased. The data is also comparable to the Australian publishers' aggregated nominal sales data that is reported in Finding 1. It does not take into account bookseller mark-up to retail prices.

Finland, a leading nation in PISA student evaluations, has an educational funding system in which local government authorities provide the bulk of funding for classroom teaching and learning materials, such as teaching and learning kits, textbooks and educational software. The average spending per district was the equivalent of A\$175 per primary and secondary student in 2007 (at 2007 exchange rates).

In the last few years the Dutch government has changed its textbook policies in secondary education. As part of the government's block funding of schools, €325 (2011) has been allocated for each secondary student (the funding is provided to schools) for the purchase of textbooks and teaching materials. The genesis of this policy lay in public concerns about the inequity of access to classroom teaching and learning materials.

The ability of schools in Dutch high SES areas to charge parents fees, and growing inequity of access to classroom resources as a result of parents' purchasing power in different SES environments, led to this change in Dutch policy. Complementing this policy is a new requirement that precludes schools from levying fees or charges on parents to contribute to the funding of textbooks and other teaching and learning materials. Secondary schools receive these funds (€360 in 2010) as a component of their block grants and are empowered to develop investment and spending decisions based on the needs of the

¹⁰ Danish, Swedish and French data is based on aggregated nominal sales similar to the APA aggregated nominal sales data.

schools themselves. No similar allocation has been made for primary students and schools. So far this policy has proved popular for the Dutch government.

This investment in textbooks and primarily print-based materials occurs in the context of extensive investment in ICT. The Dutch government also invests in a national, digital platform with a uniform standard for open source materials for primary and secondary education. This follows developments in Norway, where the national government funds publishers to offer free digital material to teachers and schools.

How does Australia compare?

International comparisons conducted by Angus et al. (2004) showed that Australia's spending on primary school education was below the OECD average. With regard to the funding of primary schools, Angus concluded that Australia ranked 19th out of 28 in relation to spending (in US dollars); 20th out of 28 in relation to percentage of GDP spent on primary education, and 20th out of 28 in relation to the widest gap between primary and secondary funding. However, recent expenditures undertaken in the Building the Education Revolution, including expenditures on the national partnerships, has changed this comparison. These conclusions are confirmed in relation to Australian spending on commercially published classroom teaching and learning materials.

The low investment in teaching and learning materials revealed by the APA sales data with regard to access to classroom materials reflects the general underfunding of Australian primary schools described by Angus. State governments make no specific allocation of funds to primary schools for the purchase of teaching and learning materials. Although schools may allocate a proportion of their global budgets to the purchase of textbooks and teaching and learning materials, the quantum of funds often reflects the socioeconomic status of the local community, and the ability of the parents and friends of the school to raise funds for the school in the community.

By comparison, the Federal Government announced a flagship targeted program called the National Action Plan for Numeracy and Literacy (McMorrow, 2008). In 2008, 2009 and 2010, students in Australian schools sat the NAPLAN (National Assessment Program in Literacy and Numeracy) tests in Years, 3, 5, 7 and 9. The cost of each test in 2008 was estimated to be A\$42 per student (including test analysis data software). This means that A\$42 was spent on NAPLAN testing for each student in Years 3 and 5. This is far above the investment per capita in classroom teaching and learning materials in many primary schools. For many students the NAPLAN-coloured booklets containing stories, items and problems are the only materials in full colour that students encounter in their classrooms.

As part of the stimulus package targeted at stimulating the economy during the global financial crisis, and in response to debates about increasing investment in Australian schools, the Federal Government's Building the Education Revolution Program allocated A\$14.7 billion to provide new and refurbished school facilities over three years to meet the learning needs of 21st-century students and teachers. The government specifically allocated \$12.4 billion to provide new and refurbished facilities to Australia's underfunded primary schools.

A specific investment is required to assist Australian schools to access high-quality teaching and learning materials that meet the needs of 21st-century teachers and their students. This would support the successful implementation of the Australian Curriculum.

Are other countries replacing classroom print materials with digital learning resources?

All OECD nations are investing heavily in digital learning resources. However, most OECD nations are continuing to invest in print resources as well. Apart from the state of California in the United States, other OECD countries are maintaining and, in the case of the Netherlands, allocating more funding to individual schools to provide commercial print and digital classroom teaching and learning materials. This is in addition to investing in digital learning resources and establishing digital education repositories in the same way that Educational Services Australia is developing the Digital Education Repository to support teaching of the Australian Curriculum. Findings 9 and 10 comment on the Dutch provision of commercial print and digital textbook materials and digital education repositories.

Finding 4

Australia has inequitable investment in curriculum teaching and learning materials

Analysis of school annual reports (to their communities) reveals a major imbalance in access to classroom teaching and learning resources between schools and school systems and between private and government schools.

Each year, many Australian schools present annual reports to inform their communities of their achievements and future directions. States such as New South Wales increasingly require all government school annual reports to follow a common format to make them easier for parents to interpret.

In some states, schools and school systems currently provide financial data in their annual school reports. For some schools and school systems this data shows areas of income and expenditure in percentage terms. Still other schools and school systems have provided financial details of nominal income and spending.

Analysis of school annual reports that present nominal financial data was undertaken to identify spending on teaching and learning resources, such as textbooks, software, kits and other teaching and learning material. In some cases these are termed 'Purchase of Resources/Learning Areas' or 'Subject Cost Centres, Subject Expenses and Teaching and Learning: Key Learning Areas'. Accountability requirements do not mandate the identification of specific spending on textbooks and curriculum teaching and learning resources.

As a result, a number of expenditure items can be included in expenditure categories in which teaching and learning resources appear. These include the costs of teacher professional development, subscriptions to teacher associations, spending by subject departments and teaching groups on specific teacher needs.

In some cases up to half of the expenditure under these types of budget cost lines is undertaken for teacher professional learning needs. Accordingly, the data on spending on textbooks and teaching and learning materials in school reports is difficult to interpret and analyse.

Table 4 reveals the variation in spending in a representative sample of 10 primary and 5 secondary schools from a NSW Department of Education and Training (DET) school region.

Table 4 Variations in spending on teaching and learning materials between schools in a government school region

Primary school	Total spending on teaching and learning per student
School 6	\$68 (highest)
School 1	\$55.90
School 4	\$53.81
School 10	\$47.44
School 2	\$43.61 (median)
School 7	\$35.70
School 9	\$32.20
School 8	\$28.11
School 3	\$21.96
School 5	\$19.31 (lowest)
Average for the region \$42.10	
Secondary School	Total spending on teaching and learning per student
School 1	\$80.27
School 2	\$66.75 (lowest)
School 3	\$108.12 (highest)
School 4	\$73.45
School 5	\$89.40
Average for the region \$73.90	

The above data correlates highly with the APA sales figures presented in Finding 1. This and similar data show marked variations in spending on teaching and learning resources within a single school system.

A comparative analysis of annual school report data between private, independent and government schools with book-list, book-hire and class-set funding systems shows an even more marked variation, with many high-fee independent schools having more than six times the textbooks and teaching and learning resources than that identified in local government high schools. The research collected book lists from such schools and calculated the average cost to parents through their contributions to fund book lists.

The Australian Scholarships Group's data also illustrates this inequity.¹¹ Table 5 shows an inequity ratio calculated as the cost of the textbooks in independent schools and private schools, as a multiple of the costs in government schools.

¹¹ This survey data somewhat overstates parents' spending requirements since only new textbooks are included in the survey. Many book-list schools also offer second-hand books and second-hand book purchasing systems. Secondary curriculum changes can increase aggregated nominal sales markedly as the second-hand book market cannot operate in the first year of a change in curriculum.ales data.

Table 5 *Inequity between private schools and government schools based on Australian Scholarships Group's costs survey for the start of 2007*

Type of secondary school	National average secondary 2007 60 schools
Private school average (book list)	\$590
Difference between highest and lowest cost	\$57
Catholic systemic and denominational school average (book hire)	\$391
Difference between highest and lowest	\$72
Government school average (class set)	\$167
Difference between highest and lowest	\$52
Inequity ratio Government average as a proportion of private school average	28% .28 of private school average
Increased spending required in government schools to match spending in private schools per student	\$423 per student

These survey results and school annual report comparisons correlate with earlier studies from the 1990s (Laws & Horsley, 1992; Horsley, 2001) on inequity in access to textbooks and teaching and learning materials between government and non-government schools. The amounts elicited from the survey also provide a preliminary benchmark for primary and secondary spending on textbooks and teaching and learning materials. Students in high-fee private secondary schools operating book-list systems have, on average, six times the curriculum teaching and learning resources of their government school counterparts.

This does not mean that teachers in high-fee private schools do not produce their own teaching and learning resources, or that teachers rely on them as core classroom learning resources. However, this much greater access to print and digital textbooks and similar resources means that teachers in these schools can spend less planning time producing classroom resources and can utilise a wider range of pedagogies that more resources enable.

Finding 5

Teachers develop their own classroom teaching and learning resources, and schools own the process of investing in classroom teaching and learning materials

What is the impact of school autonomy on investment in curriculum teaching and learning materials?

The Allen Consulting Group Report on School Based Management in the ACT (2009) reported that 'school based management is premised on the notion that those at the fore of school operations are best placed to make decisions that support the needs of students and of the local community'. While in the past, centralised school-funding formulas determined the investment that schools could make in classroom teaching and learning materials for their students in government schools and, to some extent, non-government schools, increasingly, school-based financial management allows schools to make these decisions themselves. Although the extent of school-based financial management differs in government schools from state to state, and between government and non-government schools, research on school financial autonomy reveals three significant findings for this report. These findings include:

- School-based management practices differ significantly between states.
- The government school system with the greatest financial management and budgeting autonomy – that is, Victoria – features government schools with the greatest investment in classroom teaching and learning resources compared with other states.
- Schools often do not embrace the flexibility afforded them by school-based management (Allen Consulting Group Report, 2009).

These findings suggest there is a relationship between school autonomy and school investment in curriculum teaching and learning materials. Increasing school autonomy will result in increasing investment.

This section reports on research regarding the way that schools undertake the process of investing in classroom teaching and learning materials. It outlines how schools allocate funds for this purpose, how they purchase textbooks, fund photocopying and consider alternatives. In addition, it outlines the criteria they apply to making choices about investing in classroom teaching and learning materials. This section will also report on in-depth interviews undertaken towards the end of 2009 with six principals (three secondary and three primary) from New South Wales, Victoria and Queensland. The purpose of these interviews was to elicit information relating to:

- the processes that schools follow in making decisions about investing in teaching and learning materials
- the criteria that teachers and schools use to make choices about alternative teaching and learning materials
- the current context in making choices relating to the investment in resources.

Principals responded that there were many areas of expenditure and activity on which they had to report, but that expenditure on teaching and learning resources was not one of them. They also identified that there was a strong trend across schools to invest more in ICT infrastructure, often with the assistance of parents. In some cases, principals have indicated that they are moving away from printed materials to provide better access for students to information from digital sources – digital

materials were perceived as being less expensive. Furthermore, greater use of interactive whiteboards was seen to reduce photocopying somewhat.

What current criteria are used to allocate the funds spent on teaching and learning materials?

Most principals did not articulate specific criteria for the allocation of funds spent on teaching and learning materials. In responding to the question, principals suggested that investments are made to support the teaching and learning program within the budget parameters, as a result of school strategic planning that required school community input. They usually report that teachers indicate their teaching and learning needs through a budget process. This process involves all staff, and all decisions are taken at the school level. It usually consists of submitting an itemised request, with supporting evidence for the purchase of the requested classroom teaching and learning materials, which is then considered by a committee concerned with providing funds for such purchases.

Some principals (mostly secondary) reported that they made preliminary allocations based on a historically determined formula. For example, 'I allocate a given amount of money to each faculty. They can even carry this over, especially when curriculum change is close. This means that my school replicates the school budget process at the faculty level.'

Resourcing curriculum teaching and learning in schools is complex and a major managerial responsibility. Principals reported that 'most schools like ours in the state do it somewhat similarly but there are differences in each school, reflecting the culture of the school and the management experience and practice of the principal'. In four of the schools involved, non-teachers such as parents and other school stakeholders, such as administrative staff and business managers, were involved in the budget process and allocation decisions.

Principals report that there is a sense of ownership in this process. They noted: 'Well, if we are planning I'd like to think that resources are aligned to the particular topics that we have chosen. This process should be school-based. We [the teachers] determine how we resource our programs of study.'

There are no specific criteria that are education system determined, but when resources are purchased as part of a funded program (such as the national partnership programs), there may be proportions specified in the agreement that are seen as 'acceptable'. Principals have considerable autonomy in this area, though with some differences between government and non-government school systems.

As part of registration and accreditation requirements in some states, schools need to provide evidence that the curriculum they deliver is supported by an appropriate level of resourcing. For example, the NSW Board of Studies' inspectors also assess the quality of resources, such as library collections, in relation to the scope of the schools' educational programs and the numbers of students.

How are these investment decisions made? Describe the process for investment? How are competing investments considered by the school?

These questions were responded to holistically by principals. The schools' budgeting processes were described, and the way that the budgets were framed was outlined.

Principals saw the role of making these investment decisions as an example of their own and their school's autonomy. Some principals reported that their systems had recently developed some financial management training for principals to help them monitor DEEWR-funded aspects of their budgets and make them more aware of what the funds were being allocated for.

Two of the principals led schools being provided with significant low SES state and federal funding as part of the National Partnerships initiative. The amount of funding and the reporting requirements were seen as overwhelming.

Equity and access were described, by principals, as underpinning some of the investment decisions at the school level. At the system level, every opportunity is taken to redistribute discretionary funds where possible to school communities that are less advantaged; for example, low SES schools.

ICT was not seen by principals as a competing investment but as crowding out all other forms of investment in classroom teaching and learning materials. For example, the rollout of laptops for each student program was a major management task in schools. No principal discussed photocopying unless the interviewer raised it specifically, and so principals did not associate photocopying with providing classroom teaching and learning resources.

What issues underpin spending on teaching and learning materials?

This question seemed much easier for principals to respond to than questions on criteria used to make choices about alternative investments in classroom teaching and learning materials.

The issues raised, in order of rank, included:

- teachers' requests for teaching and learning resources
- availability of funds
- new needs and curriculum requirements
- program requirements, such as literacy and numeracy initiatives
- school planning and priorities, including use of NAPLAN data to diagnose the need for new classroom teaching and learning resources
- sponsorship and parent contributions (capacity of parents to supplement global budgets)
- principals' and teachers' views on what best supports teaching and learning (a SmartBoard versus textbooks)
- school participation in specific programs, such as MultiLit, which require particular resources
- planning cycles – annual versus five-year cycles
- special groups or projects as priorities, such as assistive technologies for students with special needs; and whether funds can be used on teacher release for PD, as opposed to classroom teaching and learning materials.

Another issue raised by principals was that schools compete with one another for students and that they often feel pressured to purchase technology, such as interactive whiteboards, because other local competing schools have purchased such new technologies. This spending is often not matched by professional development for teachers to make the most effective use of these new technologies.

What is driving current investment decisions?

The key factor driving investment decisions internally reflected a school's needs as determined by the principal, the teachers and the budget process through school strategic planning and budgeting processes. ICT was reported by principals as the main factor driving investment and management decisions, through ICT programs like connected classrooms, the digital revolution, 'C2C (Curriculum to Classroom)' and other system-wide investment priorities.

In this way the investment priorities of the system established investment priorities in the school. This ICT investment had an external source but was seen as dominating many aspects of current school management. There was some reaction to this – in the words of one principal, ‘We certainly don’t want to see our younger students operating as Year 12 graduates. What is a reasonable expectation about ICT? Do we want every child making movies and doing video editing?’

Principals reported on a major shift in thinking about current and capital expenditure. In the past the purchase of ICT hardware and software was considered a capital expense, requiring a significant proportion of a school budget and mostly supported by the government or parents’ contributions. Print materials, such as teaching and learning kits and materials, were seen more as recurrent expenditure items and were therefore reported as such. In class-set schools, textbooks were purchased to top up class sets; in book-list schools, new titles were prescribed for parent purchase. However, this conceptualisation of recurrent and capital expenditure has changed. Nowadays, given the ubiquitous nature of ICT, the quantum of spending on it dwarfs all other forms of classroom investment to such an extent that it has come to be considered more as recurrent, than capital expenditure. The purchase of a new class set of textbooks in a class-set or book-hire school, however, is seen as a major capital expenditure requiring careful consideration. There are also alternatives to print materials – photocopying them.

Principals reported that external current drivers of investment decisions that influenced the schools included:

- DEEWR accountability and transparency agenda – the My School site, which compares schools’ performance and competition between schools for enrolments
- costs of ICT (requiring significant expenditure from global budgets)
- large volume of funds available for schools in low SES areas and underperforming schools (but targets, significant accountability and administrative and reporting requirements of national partnership projects were a significant component of expenditure in these projects)
- what teachers believe about how best to improve student outcomes (the key target is improving teacher quality, but teachers do not connect their quality with the quality of the resources they use – unless it is a SmartBoard)
- e-books, and purchasing digital versions of textbooks, to reduce the load on teachers
- less print, affording more in applications and access to digital repositories (access in the home and at school).

Principals reported that there was a perception that currently teachers and schools had ownership of the allocation and investment in classroom teaching and learning resources at the school level, and that this was one of the most positive aspects of current school management. There was some awareness that future changes to copyright regulations, especially in the digital environment, will be relevant.

In what ways are the uses of teaching and learning materials by teachers critical for student achievement?

The principals’ response to this question was to question the definition of teaching and learning materials. If such a definition includes ICT hardware, this is where the investment is going – everyone is seen to be moving to one-to-one learning environments despite the evidence that says ‘it is not a silver bullet’. In the words of a regional supervisor, ‘Schools complain when they get less teacher release, or literacy allocations for ESL, or we take too long to deliver a wireless network for them, but they are not vocal about “classroom teaching and learning materials”. There is so little research around this that it is just not part of their conversations. They will have a “what works” conversation about

websites or software packages/programs, like Hot Maths, but that is about it. “Classroom Teaching and learning materials” do not have a high profile; they are just not seen to be a “popular” part of educational conversations. They are not seen to be 21st-century learning; ICT dominates all.’ The agenda for PD for teachers is driven by this pathway; much PD is driven by ICT demands.

What are the conclusions of this research drawn from interviews with principals?

The main conclusions of this research are that:

- teachers and schools see investment in classroom teaching and learning materials as best made at the school level (in fact, the principals spoke of the value of this ownership at the school level.)
- any move to develop a centralised system of providing classroom resources would conflict with the autonomy, choice and pride that principals express in helping their teachers secure resources for their classrooms
- the current system is underfunded and reduces the impact of teachers' options, but it is flexible and is teacher-driven through a dynamic education market
- ICT spending is so vast that it is centrally determined and allocated, reflecting centrally determined priorities.

Finding 6

Teachers use a wider variety of classroom teaching and learning materials from an increasing variety of sources to support their teaching and learning and pedagogy in the 21st century; teachers mediate all classroom teaching to meet the learning needs of their students

What are the principles underpinning teachers' selection of classroom teaching and learning materials?

Current thinking about the role of classroom teaching and learning resources contrasts 'designs for learning' and 'learning design' (Selander, 2009).

Designs for learning is a phrase that captures the paradigm of prefabricated learning materials, such as textbooks and online knowledge sources prepared for student use. It echoes learning constrained by a knowledge focus, understandings and application of algorithms; didactic teaching methods (both digital and non-digital); and school timetables and constricted pedagogical frames.

Learning design represents a new paradigm for considering the role of classroom teaching and learning materials and the role they can and do play in deep and purposeful learning.

According to some, traditional and even new textbooks and teaching and learning materials (any print materials) are expected to vanish into the Internet trash compactor.

In the 21st century, Australian teachers attempt to create student-centred learning environments. Increasingly, they seek to secure and locate teaching and learning resources that support their pedagogy, customise teaching and meet the personal learning needs and prior learning of the students in their classes.

Teachers seek, locate and use a multiplicity of classroom teaching and learning resources from commercially published textbooks, kits and learning materials, wikis, podcasts, digital learning objects, websites, teacher self-developed knowledge and activity resources, references and photocopies. Basically, teachers use a wide variety of classroom resources. The same teacher uses different resources for different lessons and topics. They may use a class set of textbooks for one topic or lesson, and photocopied sheets from different textbooks for another lesson or topic. Alternatively, they may use an interactive whiteboard for another lesson or topic, and digital resources in the computer lab for another lesson or topic. Furthermore, some topics require all of these resources in the unit or topic program that the teachers collectively have developed for a sequence of lessons. In this classroom resourcing environment, cost, ease and speed of access are critical to the classroom teaching and learning resources used by teachers.

What underpins the selection, design and use of classroom teaching and learning resources by teachers?

Increasingly, teachers seek to match teaching and learning resources to the learning needs of the students in their classes to develop a more personalised learning environment (Hopkins, 2010). They mediate and modify all teaching and learning materials to meet these learning needs and curriculum requirements. A number of recent studies (Zikarova, 2003, 2006, 2011) have shown that teachers initially evaluate teaching and learning materials before modifying their use in many ways.

This shift has been described as learning design, rather than design for learning. Prefabricated resources – such as print and digital textbooks and other commercially produced teaching and learning materials and digital resources such as learning objects and websites providing knowledge and activity sources –

are modified, adapted and augmented by teachers as they are used (Horsley, 2006). The case studies provided in this chapter are examples of this process. Such modifications are made to fit the materials to the schools' programs of learning, which are developed to implement the curriculum.

Teachers then continually modify the materials so that they are more able to meet the learning needs of their students. Even in a multiple-source resource learning design environment, textbooks and commercially produced teaching and learning materials and rather didactic online knowledge sources all play a critical role in supporting teaching and learning. They provide the structure of the resource space that teachers choose from, and provide both interpretations and models for implementing the curriculum and personalise learning.

It is this mediation that makes the analysis of the impact of spending on classroom teaching and learning materials so problematic. It is not only access to materials resulting from investment and spending that is a key consideration in measuring the impact of spending on teaching and learning materials, but their subsequent impact on restricting mediation and limiting use by teachers.

How pervasive are print textbooks and other printed teaching and learning materials in current education systems?

Reports from the Trends in Mathematics and Science Study (TIMSS), student achievement evaluations show that at least 90% of all mathematics lessons in all countries, including Australia, used either textbooks or worksheets (Hollingsworth et al., 2003). Jamieson-Proctor and Byrne (2008) revealed that textbooks still provide a de-facto teaching and knowledge base for many classroom teachers, are a critical resource to support teaching and learning, and are used daily by classroom teachers.

Textbooks are still very pervasive in class-set and book-hire schools because they are the source for photocopying. New teachers and those teaching outside their subject area also tend to use textbooks more heavily (Walker and Horsley, 2006). Many teachers do not use textbooks because they are very capable of developing their own resources for teaching key concepts without textbook resources. These teachers would rather have funds to develop their own production of teaching and learning materials to support their own approach to teaching and pedagogy. Many principals support this approach as well.

Most teachers need print and digital textbooks to mediate. Alternatively, they have to develop their own knowledge and activity sources for students to use in their classrooms. Increasingly, modern textbooks and teaching and learning materials are designed to meet multiple pedagogical needs through the incorporation of advanced pedagogic features, and are more likely to assist in the process of mediation and modification for specific groups of learners.

New high-quality textbooks and teaching and learning materials, such as literacy and numeracy kits, are developed to reflect the learning design approach. The provision of linked website resources, including interactive pedagogy, also helps to create multiple resources for student collaboration and exploration.

Increasingly, commercially published teaching and learning resources are interpretations of the curriculum, based on the classroom practice of the teachers who author them. They increasingly provide resources for student-centred learning and collaboration, and scaffold further research and activity.

As such, teachers need greater access to these current high-quality teaching and learning resources to expand their repertoire of teaching and learning strategies.

What innovations are taking place in digital content support for teaching and learning?

Many of the classroom teaching and learning resources currently provided digitally consist of professional support materials to assist teachers in designing and teaching lessons, units of work and specialised teaching topics. Textbooks tend to be prepared for students to read and use.

Recently, however, many countries have teachers working collectively to develop free digital textbooks through similar processes to those used to develop Wikipedia. These are textbooks that are produced, exchanged and used by teachers through online collaborative design. The OECD (2005) refers to such digital learning resources as the 'textbooks of tomorrow'.

These textbooks are available online and can be downloaded; however, many schools and teachers photocopy or print them on demand. The best-known example of a supplier of these materials is *Sesamath* in France, which provides Maths textbooks and discussion lists and newsletters for teachers, parents and students on the *Sesamath* website. A number of similar and free textbooks (in terms of design and development) have been produced in Sweden, the United States and other countries. This movement has been analysed by Bruillard (2009) and others. It is discussed here because textbooks, from whatever source, provide student knowledge and activity sources that are critical for students and teachers. Teacher mediation and modification of teaching and learning resources are often based on teacher evaluation and understanding of textbooks that have been prepared for students. Restricting access to textbook resources impairs teachers' ability to mediate and modify resources for the classroom.

Recently, commercial publishers have been developing digital textbooks that simplify the process of mediation and modification for specific classes. By going beyond the PDF reproduction of a print text (which is very difficult to modify), publishers have developed an online support of a digital text that closely aligns with the structure of the text and allows teachers more flexibility in modification and mediation.

Do teachers invest their own funds in classroom teaching and learning resources?

Evidence, presented in the Vinson Report into Public Education in NSW (2002), revealed that teachers spend a considerable amount of their own money on classroom teaching and learning materials, including textbooks. A recent study of Canadian teachers (Denison, 2006) showed that they spent CAD\$255 annually on commercially published textbooks to assist in their planning and teaching. Unpublished studies in the late 1990s (Horsley, 2000) outlined that Australian teachers were claiming a deduction for textbooks and other commercially published professional materials against their taxable incomes of approximately A\$225 per year. It can therefore be concluded that teachers invest in ICT and software, as well as commercially published textbooks and professional library materials.

Case studies of how teachers resource their lessons

The following case studies were developed through discussions with teachers during 2006–2008. These teacher voices were provided to assist pre-service teachers to consider how they were going to plan to resource their lessons in a case-based teacher education program. The names of the teachers and schools have been changed.

These case studies illustrate a unique Australian model of how teachers use a variety of curriculum teaching and learning materials, which they mediate to develop classroom teaching and learning resources to support their teaching.

The customisation and construction of these individual curriculum teaching and learning materials are influenced by a number of factors, including:

- individual teacher experience and skill
- teacher beliefs and pedagogy
- the nature of knowledge within different subjects areas
- curriculum and assessment demands of individual subjects
- the availability of a range of curriculum teaching and learning materials
- the availability of the latest print and digital textbooks at the school
- the availability of resources, such as teacher time and photocopying access, and of ICT resources
- knowledge of the corpus of materials available.

Elaine, a teacher of senior science subjects

Elaine currently works at Greendale High School as Head Teacher – Science. She teaches a number of science classes; however, here, she outlines how she resources her physics class.

Elaine has taught NSW Higher School Certificate Science for ten years at six different comprehensive government high schools. She says that her perception of the accessibility of resources in her early years of teaching may not be indicative of what resources were actually available at the school. In her current school, the availability of teaching resources is perceived as high, and there is an extensive range of other learning materials.

Elaine has marked Higher School Science for many years and has worked as a consultant on the development of a science textbook. She also provided material to cover topics in the syllabus not covered by these existing texts. As an executive teacher, Elaine is also involved in implementing the Quality Teaching Program, which examines school-wide pedagogies and visions. This has implications for teaching and learning practices in each faculty and in her subject of Physics.

Overall, Elaine feels that her teaching styles have evolved since she first began teaching. She depends less heavily on existing learning materials and feels that some teaching strategies are more effective. For example, they are 'better at helping students search out the meaning' of information by providing necessary scaffolding to link knowledge:

- using better questions to develop understanding
- providing better analogies
- providing more authentic experiences.

In her two previous schools, Elaine frequently utilised more student-centred approaches to learning, such as independent research strategies and student contracts. However, at her current school, the culture of learning is not as conducive to student-centred learning because students are generally 'off task' and have 'no faith in their own ability to do things'. While the school has a good reputation for helping students with learning difficulties, the 'more able students tend to be overlooked, although this is changing'.

Elaine says: 'I use textbooks, but often stop and elaborate on content, discuss meanings, so I often give more examples, relate textbook material to recent learning, reflect on what is relevant to the course, perhaps discuss students' opinions of the graphics. I also use the Internet, especially sites such as the HSC online site, and the "How Stuff Works" site. I use blackline masters for worksheets and all the worksheets I have made and collected over the years. We use prac materials, videos and TV documentaries and experts; visitors with expertise in a field relating to a science topic. We also use assessment materials to provide feedback about the level of learning, and students' ability to synthesise new information. The Science Syllabus is in my teaching toolkit.'

'My class has real "positive dynamics" and is a pleasant class. Although the students appeared to be interested in Physics and understand "broad concepts", they seemed to lack the ability to transfer the "detail of the concept" to answer questions. This class had very limited experience in using the "verbs of the syllabus" and practising the new styles of HSC questions. Their inability to interpret HSC questions could also reflect my own lack of understanding of the language of assessment.'

'I use teaching and learning materials such as textbooks to help the students achieve the learning outcomes. I also show DVDs, YouTube excerpts and movies to students to help them understand key concepts; and photographs give an authentic image. That is, if the context is meaningful, they catch onto the concept, such as the concept of a horse jumping over a hedge maze to show the uncertainty principles. Also, prac activities that provide authentic experiences, such as the use of rolling balls on a billiard table to show vectors.'

'I use textbooks and photocopied pages to provide opportunity for skill development in areas such as:

- literacy and comprehension
- technology skills, such as the use of the Internet
- numeracy skills
- scientific skills using scientific equipment
- opportunities for independent skills, such as reading, summarising and analysing.

to provide opportunities to develop a cooperative work ethic, undertake independent research functions and then share work in a learning community as a whole.' Elaine makes extensive use of the syllabus with her class in the following ways:

- as a whole class, to relate their learning to the syllabus requirements
- as a whole class, to explore; investigate how the verbs are used in the syllabus; and explore how questions will be framed around the syllabus
- as individual learners, to encourage students to monitor that all areas of the syllabus have been covered and to identify the part of the syllabus that the new content covered in class comes from
- as individual learners, to look at the depth of their learning; for example, listing information is more shallow than evaluating information.

Elaine says, 'I am always modifying and adapting published learning materials to suit my class by photocopying, cutting and pasting and making class sets of notes from other books. At one of the schools I taught we had very few sets of texts; they were very old and I had to make my own copied sets of notes all the time. I also construct worksheets, including diagrams I construct at home on the computer after searching relevant websites.'

Due to the very limited time that Elaine has (as she has head teacher responsibilities), she tends to modify materials 'on the spot': take a resource as a whole and modify it at the time of teaching. For example, ask students to leave out a question or, more frequently, add a series of questions, allowing them to progress in a more structured way towards the more difficult text question.

Elaine was asked why she would modify and adapt these learning materials for her Science class? Her reasons included:

- not in the course
- too much depth
- adjust to suit students (abilities)
- leave out inaccurate/outdated information
- include processing questions to go with diagrams
- deal with complicated words (for example, add definition or explanation, or spaces for students to add their own definitions)
- turn into a literacy exercise
- to make interesting
- unfamiliar vocabulary/difficult text – add a flow of questions/exercises to:
 - lead into the harder questions
 - help understand the sentence
 - reduce the incidence of students finding a word (in the question) and copying out any text relating to the word (reduce shallow processing to enhance deep learning).

Elaine was also asked: 'How does your customisation of learning materials for your Science class reflect your learning environment?' She replied, 'If students are independent learners, the materials are more self-directed. However, at the beginning of Year 11 the students require strong directions. That is, they are provided with:

- outcomes
- marking guidelines
- hints – coaching for assessment tasks; for example, "Include these parts, discuss each one, and relate back to the points in the syllabus"
- scaffolds that are discussed in class; for example, "To write a good response, read the question, underline keywords, define the terms, explain the terms, give examples, advantages and disadvantages", where required assessment task analysis is also used as learning material for teachers to determine which questions have been done badly, such as often questions relating to the experimental process
- questions to improve problem areas; for example, "Simplify questions requiring transfers of information from complicated tables to graphs and vice versa".'

Jane, a primary school teacher

'I am not the strongest in Maths and believe that we should follow a well-organised program.' The principal said that there were not enough funds to make such an investment for all the years in our primary school. New materials would be purchased for Years 3 and 5 – the NAPLAN test years. The principal said that 'the new approach to teaching Maths required us to develop our own resources and to use photocopied pages from the last series of Maths texts (previous syllabus books) for homework as these had been produced with last year's priority school program funding (a funding source for low SES schools). There has been a continuing debate at our school over whether to purchase textbooks for primary Maths or use the funds for other non-print resources. We decided as a staff not to purchase textbooks.

'I am against this decision because, without a textbook, the parents cannot assist the children with their Mathematics and the photocopied pages do not contain the worked solutions, and thus, the parents do not know how to help the children with the problems on the photocopied sheets they have for homework. I don't teach literacy in the same way as I teach Mathematics. I prepare all my own classroom teaching and learning resources and customise each resource in literacy, but do not like this approach in Mathematics and numeracy.

'Usually in class I like to introduce the Maths work by showing the children how to do the problems and having the children work in cooperative groups to share their work and help each other with the tasks. The textbook for Year 2 is very colourful and sometimes I actually make out of cardboard or cloth the pictures, diagrams and aids like squares and boxes to make the explanations fun. The text comes with a teachers' guide that links the syllabus outcomes to the problems and topics. It also gives me some background on the content and extra activities, especially extension activity for the talented students in the class. It also has helpful teaching suggestions. I sometimes use Mathletics for homework.

'However, I would prefer that we had a textbook for most subjects as it would cut down on planning and programming, and make it easier to have the parents involved in the teaching of content. The other Stage 2 teachers do not share my approach though, and say that I am not following the spirit or approach of the new syllabus.'

Blake, an English teacher for Years 7–11

Blake Waldron currently works at a Catholic high school and teaches Years 7, 8 and 11 (preliminary) English. He has been teaching for four years. Blake says that anything is a textbook in English as the study of language text types and literature requires the actual literary product as the basis of learning activities.

'Every year all the HSC students have to be provided with the set Higher School Certificate English texts, and as a result we have a constantly increasing set of novels, poems and plays, anthologies, text-type textbooks and a range of the new materials for continuity and change provided because of the new syllabus. As a result we have a lot of English teaching resources, although it can be difficult to convince the head of department to buy new texts for Years 7 and 8 when there was little interest by the children in our current stock.'

Blake says his teaching style has changed since he began teaching and he now relies more heavily on the knowledge he has built up about how to teach, including having a learning environment that is more student-centred. This means he uses more paper and texts in English as the information source for a range of activities. 'I usually think of the activities myself or access them from other colleagues, and then prepare worksheets that are used to interrogate the photocopied or book like text! I let the students do a lot for themselves – research, reflection on

the syllabus, more group work, more discussions, peer teaching, jig-sawing – go away and find out things and then tell each other

- 'In my school, students have to buy their own textbooks which are chosen annually by the teachers. The reasons given for this:
- trialling of the different available textbooks
- choosing a textbook to suit different English classes; for example, one teachers uses Cambridge Text Types with Year 8, but most of us do not use these textbooks of English apart from photocopying some activities and using the literature and text types that these textbooks contain.'

Blake says that he does not use the textbooks in class, unless he is absent (in which case he sets work for the class). However, other teachers sometimes set reading and questions for homework to reinforce the content and concepts addressed in class.

Blake uses the Internet for 'good websites', such as one based on the British A level English course, to obtain material that can be used to reinforce content and concepts. These include appropriate and interesting graphics and 's-school'. He also takes advantage of the free resource sites provided by some of the magazines. Blake often downloads journal abstracts and other free articles to supplement his knowledge of the new senior topics in the new Stage 6 English syllabus. Blake also encourages students to use these sites, and often finds that students came to class quoting information they had independently downloaded. He has developed some materials for the interactive whiteboard purchased by the school.

Blake says that other teachers use the textbook as a tool in class. They encourage a collaborative process of reading a section of the text (one student at a time) as they feel that it is much more effective than the students reading to themselves. Following the reading of a passage, the classes discuss the passage:

- to 'get a feel for what the passage is about'
- for the teacher to 'fill in' gaps in the knowledge that students may have after reading
- to direct the development and application of knowledge by using pertinent questions.

Blake says that time is a huge factor in modifying and adapting learning materials to suit various class levels, and that a teacher's home and working environment do not allow enough time to customise learning materials in a way that he would like. Often he has prepared last-minute 'patchy' lessons.

Finding 7

More research is required on how teachers select, evaluate, prepare and use teaching and learning materials for their classrooms

What are the conclusions of research on classroom teaching and learning expenditure?

One way of rationalising inequity in education is to echo Hanushek's famous dictum (1997, 2003, 2007): '...there is no systematic evidence that more resources, such as lower teacher–student ratios or per-student expenditures would improve learning'. A large number of studies, based on Hanushek's production function type methodologies (and other multivariate statistical studies), seem to confirm this conclusion.

Research that estimates the impact of school resources on achievement and equity in evaluating PISA results does not use data on textbooks and teaching and learning materials expenditure, but an index of school resources that is not focused on the availability and use of classroom teaching and learning materials. OECD countries do not collect data on spending on classroom curriculum teaching and learning materials. Even so, recent explanations of PISA results across OECD and partner countries have included an extensive analysis of resources, policies and practices in explaining 2009 PISA results (OECD, 2010).

Until relatively recently, most research on student achievement and expenditures has concentrated on school input measures, such as teacher qualifications and spending per student. However, more recent research on school effectiveness measures, such as school policies and teaching and learning strategies relating to student learning and achievement, has developed some new insights into the relationships between access to classroom teaching and learning resources and student achievement.

Access to textbooks and teaching and learning materials and their use by teachers is not captured in PISA-sourced research. However, one PISA-based research result reveals that school and teacher selection of teaching and learning materials positively influences student achievement (Woessman, 2005).

PISA and TIMSS student evaluations have fostered a growing corpus of research on school factors related to the quality and equity of education. Grubb's (2008) research has shown that correlations between expenditure inputs and student achievement neglect the fact that many of the inputs are not independent of one another. They interact in complex ways that are ultimately created in schools by teachers and other educational staff. These findings have provided new priorities in research on the relationship between teacher quality and student achievement.

What insights does teacher quality research provide?

The current consensus in the area of student achievement is that teacher quality is the main determinant and that notion is responsive to government policy. Previous research on key factors influencing student outcomes has focused on teacher quality and socioeconomic (SES) student characteristics (Rowe, 2003).

The current research landscape is dominated by the work of researchers such as John Hattie (Visible Learning, 2009) and Ken Rowe (Teachers Make a Difference: What is the research evidence?, ACER, October, 2003.) Hattie's approach has been to conduct meta-evaluation and validations of the results of meta-evaluations. His widely reported results suggest that:

Schools account for about 5–10% of the variance in studies of student achievement. Schools barely make a difference to achievement. The discussion on the attributes of schools – the finances, the school size, the class size, the buildings are important as they must be there in some form for a school to exist, but that is about it (Hattie, 2003).

Hattie's research has identified a number of influences and effects sizes on student achievement, which has confirmed that it is teachers who account for 30% of variance in student achievement. 'It is what teachers know, do and care about which is very powerful in this learning equation' (Hattie, 2003).

But what is it that quality teachers do?

Student learning and achievement is affected by many factors, including the student, the teacher, the place and context of learning and the environment in which learning takes place. In practice, these factors include teacher–student interaction and communication, student–student interaction, learning materials and tasks, learning climate, social atmosphere and the embedded culture and context of the class, school, school leadership and culture and community.

The availability of, and access to, resources is but one precursor to achievement. It is the teachers' individual use of classroom teaching and learning resources that has meaning in the complex learning context. However quality teaching may be conceptualised and categorised, perhaps the major quality teaching activity at all levels of teaching is in locating, evaluating, designing and providing teaching and learning materials as the knowledge and activity source of classroom teaching, learning and pedagogy.

It is difficult to separate teaching and learning strategies and pedagogy from their underlying basis in knowledge and activity sources. As a result, the availability of classroom teaching and learning materials becomes an initial component in the teacher quality element. It becomes a question of how much is allocated to both classroom print and digital learning books to achieve optimal learning outcomes for students. Australia has an identified gap in that respect when compared with overseas benchmarks; and this is particularly so in book-hire and class-set schools.

In this context, studies on the adequacy and equity of school resources in the United States (National Research Council, 2001) have shown that current inequitable investment patterns and levels in resourcing of schools are major factors in the decision-making processes and the culture of decision-making within schools. In addition, a number of studies have shown that the reallocation of resources within and between schools can have significant impacts on student achievement (Hawley-Miles & Darling-Hammond, 1998).

Quality teaching models focus attention on the fact that it is a teacher's *use and transformation of classroom teaching and learning resources* in the learning environment that contributes to teaching quality, and thus creates meaning for students and supports teaching and learning strategies. Another way of conceptualising this process is to acknowledge that learning resources at the classroom teacher and student level will provide a substantial contribution to student achievement and learning.

The problem with production function research methodologies that correlate inputs to student achievement is that the research methodology ignores what the teachers do with the resources at their disposal. Correlation methodologies also conflate SES characteristics and reflect the SES of the schools, which may influence teacher quality (how the teachers use the teaching and learning resources). Hakkinen et al. (2003) summarised the problem in analysing the effects of resources on student achievement by suggesting that resources are likely to be correlated with unobserved characteristics that affect achievement' (Hakkinen et al., 2003). These characteristics are likely to include how the teachers and students used the materials; and the ways the teachers designed and resourced the classroom learning environment.

Kennedy (2010) has gone beyond the meta-evaluation effect size model proposed by Hattie in exploring the effectiveness of different teaching and learning practices, and teacher quality. She proposes that exploring quality teaching requires looking beyond the teacher as the only factor in teaching quality. She proposed that thinking about quality teaching included thinking about teaching practice in the teaching context itself. The teaching context includes the school, the classroom, the classroom teaching and learning resources available to the teacher, the behaviour of the students, and the teachers' work schedule and responsibilities. Reforms that focus on solely on teacher characteristics, assessing teachers and teacher accountability ignore the reality of the teaching context. The complex ways that teacher planning and practice interact with the teaching context and the classroom resources within it are critical to developing a model of quality teaching. It is the interaction between the teachers' characteristics and the teaching context, including the classroom teaching and learning resources available to the school and the teacher, that will shape teacher practice and student learning.

What does the OECD Teaching and Learning International survey show?

A major research project undertaken by the OECD in 2009 explored the creation of effective teaching and learning environments (TALIS – Teaching and Learning International Survey, OECD, 2009). This research was based on surveys completed by principals and teachers regarding the most critical factors that contribute to the creation of effective teaching and learning environments.

One section of the report collected data from principals and teachers on the extent to which schools' capacity to provide instruction was hindered by a lack of instructional materials, computers for instruction, library materials and other equipment.

A close reading of the TALIS report reveals that classroom teaching and learning resources are identified by teachers as important in creating effective learning environments.

The TALIS research reported that:

- the physical, human and financial resources invested in schools influence not only the education provided to students, but also aspects of teachers and their teaching
- previous studies using PISA results show that the more resource shortages are perceived to hinder instruction, the lower the student performance
- inequalities in student achievement often reflect SES disparities
- schools with more students from a disadvantaged background may have fewer resources with which to educate their students (TALIS Report, 2009).

As can be expected, more than half the teachers in schools in Brazil, Bulgaria, Ireland, Lithuania, Mexico and Turkey worked in schools where the principal identified that lack of instructional materials hindered instruction. However, Australian results showed that the shortage of other equipment (31.7%), library materials (20.9%), computers (32.2%), instructional materials (15.5%), support personnel (40.4%), instructional support personnel (38.1%), laboratory technicians (14%) and qualified teachers (40.5%) were identified by Australian teachers as major issues (at less than the OECD average though). Class-set and book-hire schools can be seen to be represented in this finding; with principals reporting that the lack of curriculum teaching and learning resources hindered instruction.

What are some current research perspectives?

The TALIS report has been somewhat controversial as a result of the Grattan Institute's Report (Jensen, 2010) that indicated: to create effective learning environments, what teachers wanted was better teacher management.

This report has argued that it is what teachers do with classroom teaching and learning materials that will be important for student learning because teachers mediate the classroom materials and adapt

them for their students. In fact, it is difficult to think of a more important aspect of planning and delivering teaching than locating, planning and providing access for students to knowledge and activity sources.

Jensen (2010) and Caldwell and Harris (2008) all identify research that echoes Hanushek's dictum that input spending has no impact on student achievement:

- Nations with the highest educational spending are not those with the leading results on international measures of student evaluations, such as PISA and TIMSS (OECD, 2009).
- Despite funding in the Australian school sector increasing by 41% between 1995 and 2005, Australia's performance stagnated in Mathematics and declined in reading (Jensen, 2010; Thomson & De Bortoli, 2008; Leigh & Ryan, 2010).

However, Caldwell and Spinks and Caldwell and Harris (1988, 2008) have conducted a significant corpus of research on how global budget decisions are made in schools and the processes that are followed in schools to make these decisions. They report an OECD finding (using PISA student results) that revealed a relationship between systems of schooling that give schools higher levels of freedom to allocate funds across budget categories and student achievement in Science. Any trends to centralise curriculum teaching and learning resources are in stark contrast to the Caldwell and Harris and OECD research, which argue that greater decentralisation and school and teacher autonomy in this area of school spending will lead to more effective allocation and use of resources.

What new research is needed?

Research on teacher development and use of classroom teaching and learning resources and the way that teachers plan lessons has been neglected with the exception of studies exploring the embedding of ICT into their teaching. In the 1990s the Teaching Resources and Textbook Research Unit at the University of Sydney conducted a number of classroom observation studies, based on the use of an observation schedule that attempted to understand teachers' selection, provision of access to students and use of different teaching and learning materials in the classroom (Walker & Horsley, 2006). More recently, Zikarova and her research team from the University of Ostrava (2003, 2006 and 2011) have explored how teachers adapt and mediate the use of classroom teaching and learning resources. In Australia, Clarke et al. (2006) has led learners' perspective studies through observing classrooms in Mathematics. Some of the learners' perspective studies (2006) have explored the relationships between textbooks and homework.

In Australia, only a few researchers have explored the ubiquitous nature of Mathematics textbooks and Mathematics pedagogy (Ewing, 2004, 2006; Shield & Dole, 2002, 2008, 2009; Stacey & Vincent, 2009; and Vincent & Stacey, 2008). Ewing (2004, 2006) explored the use of textbooks and their ability to shape teachers' pedagogical practice and thus learners' identity. Although critical of print textbooks for their ability to inhibit the cooperative, the collaborative and the participatory, the research also acknowledges that print textbooks remain the central resource for teaching Mathematics.

The research of Shield and Dole (2002, 2008, and 2009) and Stacey and Vincent (2009) also acknowledged the central role of Mathematics textbooks in shaping teacher pedagogy and Mathematics learning. These studies explore how mathematical reasoning and various topics are presented in Mathematics textbooks.

A smaller number of studies (Unsworth, 2004; Ninnes, 2000; and Muspratt, 2006) have explored the characteristics of Australian science textbooks that afford or constrain learning.

In 2007 the Finnish Ministry of Education commissioned the Educational Evaluation Council to evaluate the pedagogy of basic education in Finland. This study explored teacher planning and, unlike the TALIS survey, included a range of specific questions relating to the use of teaching and learning resources

in planning for classroom teaching. The results of this research have been reported in Finding 9. The survey has also been included in Appendix 3. It is suggested that cognate research be carried out in Australia to better understand teachers' planning processes relating to the actual use of classroom teaching and learning resources.

How does the research on access to classroom teaching and learning materials link to the educational publishing market?

Australia's unique and vibrant educational publishing market has developed interactively with structural aspects of the Australian school system and the ways teachers resource their classroom lessons. Prior to the 1960s most Australian classroom teaching and learning materials were imported from the United Kingdom. However, the work of visionary educational publishers, such as Brian Cheshire, and the development of a more Australian-focused curriculum allowed a dynamic new cultural industry (Australian educational publishing) to grow and develop. Currently, very few classroom teaching and learning materials are imported into Australia. In fact, Australia has a vibrant educational publishing export industry, where a number of Australian-owned publishers have developed healthy export sales, especially of literacy materials to the United States in the last decade (O'Brien, 2009).

Key features of the operation of this educational market in Australia include:

- Compared with other nations, Australia has a large number of educational publishers. The APA has over 28 schools publisher members and there are many other non-APA educational publishers (O'Brien, 2009). About ten reasonably large publishers (the top ten) and a large number of small publishers make Australian educational publishing very dynamic. In contrast to other nations' educational publishing industries, such as the United States, a large proportion of Australian educational publishers are former teachers. In addition, practising teachers account for most of the authors of textbooks and teaching and learning materials sold in the Australian market; and in most cases, these materials reflect the approach the authors take to their own teaching. These features mean that there is high ease of entry into the industry. The absence of government adoption processes and the totally open market means that many teachers ultimately publish their own teaching and learning kits and textbooks, and develop publishing businesses.
- The educational publishing industry operates in an intensely competitive market. The materials produced by the industry are closely aligned to curriculum but, because many publishers produce textbooks and teaching and learning materials for the same subject market, teachers are provided with different interpretations of curriculum that reflect the authors' different experiences. This means that teachers and schools are provided with significant choices in terms of providing classroom teaching and learning resources for many subjects and topics and students they may teach.
- Schools and teachers exercise this choice through the selection of materials that they feel more closely meet the teaching and learning needs of their students. The exercise of this teacher and school choice not only produces intense competition in educational publishing markets, but also ensures that curriculum change is supported by new materials as publishers continually upgrade and enhance the teaching and learning materials that they supply to the school market.

Similar to all markets, demand reflects the ability of schools and teachers to purchase classroom teaching and learning materials supplied to the market. Differences in funding in different school sectors, levels and states have led to great inequity in the ability of different schools to resource their classroom teaching and learning needs.

Australian teachers are less textbook dependent for classroom teaching and learning resources than teachers in other nations as a result of the way their resourcing of classroom lessons has evolved. As a result of these two market characteristics, Australian teachers utilise photocopying in providing classroom resources (mostly from textbooks produced by the educational publishers). This process

reduces the sales and sales revenues of educational publishers, leading to small print runs in the Australian educational publishing market (O'Brien, 2009). However, since photocopying attracts licence fees forwarded by CAL to the publishers and authors, the market has a strong photocopying revenue stream that allows Australian educational publishers to continue to produce a wide range of classroom teaching and learning materials to meet specific teacher and school learning demands. This system allows the educational publishing market to dynamically meet the needs of teachers and schools, as expressed through their purchasing decisions.

Investments in digital learning resources have allowed Australian educational publishers to develop new classroom materials to meet teacher and school digital learning needs. In relation to online support for textbooks, publishers have pioneered support sites that are structured to align closely with the design of the print-based teaching and learning materials and textbooks to make them easy for students and teachers to use. Currently, publishers are developing digital textbooks that retain the current characteristics of textbooks to meet student learning needs but add digital learning features to the text, such as interactive whiteboard displays, digital workbooks that can be assessed by teachers, and case study and current knowledge updates and support. These digital learning textbooks are being produced in response to teacher and school demand for new resources for use with laptops and interactive whiteboards and other digital learning resources, and are currently being trialled in schools.

The educational publishing market has been very successful in providing classroom teaching and learning materials that are demanded and purchased by Australian teachers and schools – the ultimate measure of relevance and use. This educational market has evolved interactively with the way that teachers and schools access and use classroom teaching and learning materials.

The small multiple state markets for teaching and learning materials have been associated with a large number of small educational publishers and a dynamic industry. The development and implementation of the Australian Curriculum by ACARA and the potential change in the roles of the state Boards of Studies, from curriculum developers to be more concerned with supporting the implementation of curriculum, represent significant change in the market for classroom teaching and learning materials.

These changes may include:

- The development of possible national markets for educational materials may create a potential for greater economies of scale, larger print runs, lower prices and greater returns. This may advantage the larger publishers who operate in a greater range of subject markets.
- The state curriculum authorities interpreting and producing state-based versions of the Australian Curriculum for state implementation may constrain the potential of commercial publishers to take advantage of greater economies of scale, and may limit their ability to provide lower-priced resources.
- The ability of Educational Services Australia to provide more copyright-free materials may constrain the potential of commercial publishers to take advantage of greater economies of scale, and may limit their ability to provide lower-priced resources.
- Educational publishers will need to respond differently to the rapid growth of digital repositories. National markets, provision of free copyright materials and the growth of digital repositories may increase the concentration in Australian educational publishing.
- An increase in the concentration of Australian educational publishing could potentially lead to a smaller range of classroom teaching and learning materials being produced and less choice for schools and teachers, thus constraining the ability of teachers to customise and personalise learning materials to meet the learning needs of students in their classrooms.

Finding 8

Access to print and digital textbooks and teaching and learning materials, and teaching and learning strategies are linked

What is the nature of the relationship between access to classroom teaching and learning resources and teacher pedagogy?

Access to curriculum materials interacts with the way that teachers use them. It is teachers' use of teaching and learning materials in their classrooms that creates meaning for students. As teachers create learning environments, they transform teaching and learning materials through classroom activities for their students.

The impact of access to teaching and learning materials is difficult to measure. This is because teachers can use the same teaching and learning resource for different purposes in different ways for different students. Thus, the relationship between classroom teaching and learning resources and student outcomes can be seen as compound, complex and abstract, and actually constructed in a school (Grubb, 2008) by individual teachers for the students in their class. In one study (Walker & Horsley, 2006) different teachers' use of the same photocopied sheets was researched. This same photocopied sheet was used for totally different classroom purposes by different teachers. One teacher used the photocopied sheet as a knowledge source on which to base collaborative activities. Another teacher used the same photocopied sheet for individual student comprehension activity of a transmission of knowledge nature.

One of the features of the photocopying data is that there is a very low repeat copying rate for specific pieces of work. This means that individual teachers rarely copy the same knowledge and activity sources, but photocopy different knowledge and information sources and activities for each individual lesson. This is because many teachers attempt to develop resources for their own classes. However, this creates the need to constantly source and prepare new classroom materials.

In the previous findings, the fact that teachers mediate and determine the use of all teaching and learning materials was reported. Research (Zikarova, 2003; Walker & Horsley, 2006) reveals that all teachers modify and augment all teaching and learning materials that they have not developed themselves. Teachers interpret all teaching and learning materials from the perspective of accommodating the needs of their students.

What are the findings of research on the relationships between access to classroom resources and teaching and learning strategies?

Research has shown (Lambert, 1999; Horsley, 2001) that there is a relationship between access to teaching and learning resources and the mediation and types of teaching and learning strategies developed by teachers. Restricting access to teaching and learning resources influences most teachers to limit the types of teaching and learning strategies they utilise. Resourcing lessons is a time-consuming aspect of planning for teaching. Locating and providing teaching and learning materials are major activities for teachers (Walker & Horsley, 2006).

Restricting access to current high-quality teaching and learning resources, both print and digital, reduces the options for classroom pedagogy and disempowers teachers by reducing the pedagogical options they feel are available. Numerous studies have demonstrated this impact of restricting curriculum teaching and learning materials.

For example, Lambert's (1999) research in lower SES secondary schools in London suggested that certain 'coping strategies' (resulting at least in part from significant shortages of funds), such as never

allowing students to take textbooks home with them and using half class-sets (students having to share books), had become routine in many low-income schools. Photocopying parts of books and single pages had subsequently become a major source of teaching and learning resources for lessons.

When print and digital textbooks cannot be taken home or used at home, potential teaching and learning strategies are severely constrained. For example, students may have a copy of the page to work from at home, but have no opportunity to read what came before, nor what comes after, and thus no incentive is provided for individual exploration of the text to develop deeper understanding.

Lambert (1999) conducted an experimental study, supported by the UK Publishers Association, where subject heads of department were provided with potentially limitless textbook provision for Year 8 students. Two of the seven teachers in the study chose to 'buy' two copies of a textbook for each child – one book for class and one for home use – specifically because it was felt that traditions of home study were so underdeveloped.

During the same experiment, teachers who found themselves teaching classes with at least one copy of the textbook per student, rather unsurprisingly, found that classroom management of students' behaviour became more straightforward.

It is rarely acknowledged that current high-quality print textbooks and classroom teaching and learning materials contribute to successful teaching and learning outcomes. They often reflect new approaches and theories of learning.

What are the similarities between the uses of digital and print classroom resources?

Current theories of effective learning emphasise a student-centred approach. Print and digital classroom teaching and learning materials are increasingly conceptualised as providing opportunities for students to construct understanding through the provision of multiple knowledge sources, parallel narratives involving written text and illustrations, and multimodal resources and connections to the community of learning and practice. They assist students in developing their own understandings. Classroom teaching and learning resources increasingly provide students with activities to facilitate learning, reflecting constructivist views of the active nature of learning. This is shown in Table 6.

Table 6 *Changing conceptions of classroom teaching and learning resources*

Roles	Transmission theories of learning	Constructivist	Sociocultural
<ul style="list-style-type: none"> Classroom teaching and learning materials, e.g. print textbooks Digital learning resources (DLR) 	<ul style="list-style-type: none"> Source of information Basis of transmission Knowledge authority Structure of a teaching and learning program 	<ul style="list-style-type: none"> Activity and inquiry source Provision of multiple sources within text/digital learning resources (DLR) for student knowledge construction Multiple sources for teacher selection 	<ul style="list-style-type: none"> Scaffolds learning Enculturates students into disciplinary knowledge and practices Source of inquiry activities Basis of explicit teaching
<ul style="list-style-type: none"> Student 	<ul style="list-style-type: none"> Passive recipient of information provided in classroom teaching and learning materials and by teacher 	<ul style="list-style-type: none"> Active agent in text/DLR inquiry activities 	<ul style="list-style-type: none"> Uses text/DLR in collaboration with other students Engages in authentic activities of disciplinary communities
<ul style="list-style-type: none"> Teacher 	<ul style="list-style-type: none"> Authority in knowledge domain Dissemination of appropriate knowledge 	<ul style="list-style-type: none"> Creator of environments for active learning and inquiry. 	<ul style="list-style-type: none"> Collaborative participant in enculturation process Uses text/DLR to establish common student goals Identifies and utilises texts/DLR to create a zone of proximal development for students Uses materials to enculturate students into key disciplinary understandings

Many digital learning resources – especially PowerPoint (see Tufte, 2003) – reflect transmission approaches to learning, where other digital learning resources may reflect constructivist and sociocultural approaches to learning. Increasingly, print textbooks are likely to be seen as enculturating students into disciplinary knowledge and practices as the basis of scaffolded learning experiences and explicit teaching, and for collaborative student activity. As Table 6 indicates, the roles of teachers and students have also changed as theories of learning have evolved.

As a corollary, restricting the provision of current high-quality print and digital textbooks and classroom teaching and learning materials prevents textbooks from playing the constructivist and social constructivist roles for which they have been designed. In Australia, governments and curriculum authorities always assume that resources will be automatically developed to support curriculum development, change and reform and new approaches to pedagogy. Acknowledgement of the important role these materials play in reform will encourage publishers and alert systems to consider the funding and financing of teaching and learning materials.

Different types of classroom teaching and learning resources are also a key influence on the ways that teachers design teaching and learning strategies. The availability of certain types of teaching and learning resources for teachers promotes certain types of teaching and learning strategies, and therefore student outcomes.

Finding 9

The education systems such as Finland, Japan and Korea, who lead international measures of student achievement, and comparator nations such as the Netherlands and Canada provide greater access to print teaching and learning materials for their students; and teacher pedagogy in these nations is more structured around textbooks

Who are the leading nations in PISA¹²?

The Tables 7 and 8 provide a snapshot of the nations that are leading student achievement, as measured by the PISA student evaluation in the last four assessments for Mathematics and Science. Finland has continued to be identified as a leading OECD nation in student achievement in Mathematics and Science in the PISA international comparison of student achievement for 15 year olds. Japan and Korea also continue to be high performers in international measures of student achievement such as PISA. The Netherlands and Canada tend to have statistically similar PISA results to Australia.

Table 7 PISA Mathematics results, 2000–2009

2000	2003	2006	2009
1. Japan 557	1. Hong Kong – China 550*	1. Chinese Taipei 549*	1. Shanghai – China 600*
2. Korea 547	2. Finland 544	2. Finland 548	2. Singapore 562
3. New Zealand 537	3. Korea 542	3. Hong Kong – China 547*	3. Hong Kong – China 555*
4. Finland 536	4. Netherlands 538	3. Korea	4. Korea 546
5. Canada 533	5. Liechtenstein 536	5. Netherlands 531	5. Chinese–Taipei 543*
5. Australia 533	11. Australia 524	13. Australia 520	6. Finland 541
			15. Australia 514

Table 8 PISA Science results, 2000–2009

2000	2003	2006	2009
1. Korea 552	1. Finland 548	1. Finland 563	1. Shanghai – China 575*
2. Japan 550	1. Japan 548	2. Hong Kong – China 542*	2. Finland 554
3. Finland 538	3. Hong Kong – China 539	3. Canada 534	3. Hong Kong – China 549*
4. England 532	4. Korea 538	4. Chinese Taipei 532*	4. Singapore 542
5. Canada 529	5. Liechtenstein 525	5. Japan 531	5. Japan 539
7. Australia 528	5. Australia 525	13. Australia 527	10. Australia 527

* Non OECD countries

¹² PISA is the OECD's Programme for International Student Assessment. Every three years (2000, 2003, 2006, 2009), the OECD conducts evaluations of 15 year olds' knowledge and skills essential for participating in society in the key areas of reading, Mathematics and Science; with almost 470 000 students in 65 countries (OECD and partner countries). The focus in 2009 was on reading. Each student spends two hours carrying out pencil and paper tasks in reading, mathematics and science.

What are the major sources of classroom teaching and learning materials in Finland?

Many reasons have been proposed to explain Finland's success in the PISA evaluation of student achievement. The research reported here explores the role of teaching and learning materials and textbooks in the Finnish education system.

Although Finland invests heavily in digital learning resources, commercially produced print textbooks and associated teaching and learning materials, such as teachers' guides, are currently very important to the education system in Finland. Finland's curriculum documents promote socioconstructivist and student-centred approaches to the teaching and learning of Science. However, this emphasis is not incompatible with the production and use of high-quality student-centred textbooks and teaching and learning materials. Finland has developed a process for developing textbooks that promote student-centred learning and engagement. Finland's publishers are thus identified as key components of the education system – they are acknowledged by all stakeholders as critical to providing high-quality classroom teaching and learning materials to support learning.

It is clear that Finnish teachers use commercially produced textbooks when they plan their lessons. It is clear that textbooks are used in lessons to support teaching and learning and pedagogy. Textbooks, in the leading key learning areas, are available for students to take home, and each child has access to textbooks in this way (Atjonen et al., 2008). A recent (2008) study on the evaluation of pedagogy in Finnish schools found that, on a scale from 1 to 4 (1 represents almost no use; 4, very much), the use of textbooks was said to be very high (3.2) by teachers (Atjonen et al., 2008). This is outlined in Table 9 on page 58.

Table 9 Textbook use in Finland in teacher lesson planning

	Language of instruction							
	Finnish mother tongue teachers				Swedish mother tongue teachers			
	School type				School type			
	Primary		Secondary		Primary		Secondary	
	Textbooks		Textbooks		Textbooks		Textbooks	
	Count	%	Count	%	Count	%	Count	%
Almost no use	1	0.3	80	5.0	2	3.1	47	12.7
Some use	15	5.1	225	14.0	5	7.7	80	21.6
Consistent use	118	39.9	553	34.3	30	46.2	117	31.6
Very much use	162	54.7	752	46.7	28	43.1	126	34.1

Accompanying textbooks and teaching and learning materials for students are teacher guides or teacher books aligned to student texts and teaching and learning materials. Teacher books are perceived to be a key feature of the Finnish education system as they provide planning ideas for lessons and units of work. Teachers and educators in Finland view them as one of the keys to success in PISA.

There is strong use of print texts, teacher books, teacher packages and reference guides. These guides and teacher books are seen to provide clear guidance on pedagogy, content material and teaching repertoires. One of the key features of textbook and teaching and learning materials used in Finnish schools is the way that textbooks provide structure to pedagogy.

In 2008, the Ministry of Education in Finland published a report analysing, reflecting and explaining Finland's leading PISA results in Science. A specific chapter in the report related to textbooks (Science textbooks in Finland). The report makes the following conclusions:

Most science teachers design their lessons based on a textbook, and use it or a workbook for most of the classroom time.

Textbooks and workbooks provide the major instructional format for lessons.

In Finland science homework is given after each science subject lesson. This homework is based on the questions at the end of the textbook chapter.

(Lavonen in PISA 06, page 97)

The Finnish report also highlights the role that publishers play in the development of high-quality textbooks and teaching and learning resources; and the process of developing high-quality teaching and learning materials.

In Finland, private publishing companies play a key role in designing and preparing textbooks and laboratory books. The companies interview school teachers and conduct surveys. They then collect groups of textbook authors, consisting of school and university teachers. These groups prepare manuscripts in collaboration with editors from publishing companies. The manuscripts are then field tested.

In contrast in Australia, except in the book-list schools, many students do not have copies of recent high-quality print texts. Unless the Australian school is a book-list school, pedagogy is less structured around key print teaching and learning resources than in Finland. In addition, Australian publishers are not seen as key stakeholders in developing teaching and learning resources that promote meaningful student understanding and development of knowledge structures. Instead, curriculum authorities and education systems have provided publishers only limited access to draft curricula and the information required to get resources published on time to support the successful implementation of new curricula. If publishers were working with curriculum authorities as true stakeholders in the development of the curriculum, this would support the refinement, improvement and timeliness of high-quality textbooks and teaching and learning materials by publishers, which is a feature of the Finnish system's success.

Australian Publishers do work closely with schools, teachers and students to research and develop and test resources as they are being produced. This is similar to what occurs in Finland, although classroom trialling is not as extensive as it is in Finland.

It is difficult to envisage any Australian education report on teaching quality, student achievement and learning, professional learning and teacher education acknowledging the critical role of classroom teaching and learning materials, such as print textbooks in supporting teaching and learning.

If Finnish schools are relatively commercially produced textbook dependent, one would expect that data on spending on textbooks and teaching and learning materials would reflect this feature of the system.

In 2007 the equivalent of approximately A\$175 per student was committed to teaching and learning materials in Finnish schools. In 2008 this figure had risen to the equivalent of A\$177.

The increase in spending from 2007 to 2008 can be partly interpreted as reflecting inflation, changes in demographics and school enrolments per municipality, and educational priorities and increased and reduced spending in specific municipalities.

Comparison with the Finnish municipality data spending (education materials are funded by Finland's municipalities) indicates that, in average terms, in 2007 spending on teaching and learning for Australian students was 27% in Australian dollar terms of that expended on Finnish students.

This comparison in some ways also reflects the role of textbooks and teaching and learning materials in the two education systems.

Australian teachers in book-hire and class-set schools are aware of the shortage of funds for education and often teach in a culture of photocopying, where printed textbooks and teaching and learning resources are embedded.

What is the role of textbooks in the Japanese education system?

In a similar manner, a study of Japan's education system reveals that classroom teaching and learning resources are seen by all the stakeholders as critical components of teaching and learning and the education system, so much so that Japan has developed unique institutional arrangements to support teaching and learning through the provision of relevant resources.

Similar to Finland, Japan has developed a process to develop high-quality teaching and learning materials. Japanese textbooks are usually subject to lesson study – the Japanese teacher professional development system in which teachers collegially plan and deliver lessons and assess the relationship between pedagogy and student learning. When textbooks are in development or newly published, many are trialled and evaluated by teachers in lesson study groups with students in schools. This results in Japanese textbooks being subject to teacher and student evaluation and revision, based on extensive use in schools. As a result, Japanese textbooks have unique characteristics, format and style.

Australian commercially produced print and digital textbooks and resources are not field tested to the same extent as they are in Japan or Finland, where there is more overt cooperation between their education bodies and publishers. The Australian publishing industry operates with less close cooperation with curriculum authorities. Publishers research, test and trial resources published in Australia. The industry produces resources that teachers find accurately match learning outcomes required in the curriculum. The published textbooks are exacting in their coverage and conformity to detailed curriculum documents, despite the lack of opportunity to truly field test them in schools and classrooms, as is the case in Finland and Japan.

Australian commercial publishers are not seen as stakeholders in curriculum development and implementation. Curriculum authorities only provide publishers with limited information during curriculum review and development periods. This limits publisher's time and ability to produce quality resources as the final curriculum is often supplied too late in relation to required publishing time frames. Often this results in resources being produced in a rush, and sometimes being supplied late after the start of the school year. Earlier release of drafts and final curriculum documents to publishers would result in more time to develop the best resources, and could in future allow time to trial these in the classroom before publication, further improving the quality of Australian resources supplied and ensuring timely delivery for successful implementation of any new curriculum.

As indicated, Australia has a complex funding system for classroom teaching and learning materials that reflects the differences in funding and access to print and digital teaching and learning resources discussed in the introduction. This complex system also involves different decision-making processes for primary and secondary schools, and different resource allocations based on primary and secondary differences, with significant state differences in funding systems and allocations.

However, in Japan, the funding of teaching and learning materials and textbooks in schools is the responsibility of the National Government through the Ministry of Education. Each year the national budget contains an allocation for textbooks and teaching and learning materials for schools. This allocation is a major component of expenditure for the Japanese Government in its funding of education.

Commercially produced print textbooks and associated teaching and learning materials are currently an important component of the education system in Japan. Textbooks are used extensively in lessons and lesson planning. Similar to Finland, it is clear that textbooks are used in lessons to support teaching and learning and pedagogy. Textbooks for each subject are available for students to take home, and each child has access to textbooks in this way.

Also similar to Finland, textbooks are accompanied by teachers' guides and teacher books aligned to these student textbooks. These guides scaffold the approach taken in textbooks and provide advice and support for teachers. Because Japanese textbooks have been trialled and evaluated extensively in classrooms, their activities are seen as relevant and appropriate for students and their age and grade levels. As a result, teachers are confident that the textbooks meet student learning needs.

In Japan it is well accepted that textbooks are a public and symbolic repository of official legitimate knowledge that is mandated by the national curriculum. In this way 'textbooks very nearly assume the role of semi-official government documents, providing authoritative statements of control and the manner in which they can be seen to reflect national policy imperatives. This is not the case in countries such as the UK, USA and Germany where, although they have their own debates regarding official knowledge, local and professional involvement in legitimising such knowledge results in a more diversified process' (Crawford, 2006). Japanese textbooks, however, are nationalised and standardised.

This feature of Japanese textbooks and teaching and learning materials, while non-controversial in Mathematics and the sciences, presents particular problems and issues in subjects such as history and the humanities. Ministry of Education appointed teachers and scholars ensure history textbooks meet Ministry guidelines that determine content and vocabulary. Japanese teachers then must choose texts from an officially sanctioned list of six to eight history textbooks. However, because the Japanese national curriculum prescribes the subject matter and because each textbook must deliver this content, the texts are very similar (Crawford, 2006).

Another key feature of the role of textbooks in Japan is the development of institutions in Japan that focus on teaching and learning materials and textbooks. The Japan Textbook Research Center was established to undertake research on textbooks and their use, and to support publishers and authors to develop textbooks. The Center's purpose is to 'do basic and general research on textbooks' (Japanese Textbook Research Center, 1991). It maintains a wide-ranging textbook library that is used for research purposes. In addition, the Ministry of Education has a textbook unit that manages the textbook budget, conducts textbook approvals and manages the textbook adoption system. Teaching and learning materials are at the core of the institutional arrangements for education and a key component of the education system. All new curriculum and curriculum reforms are accompanied by the production and publication of textbooks and teaching and learning materials, and digital resources and digital repositories.

Almost all references to Japan's institutional arrangements for teaching and learning materials and textbooks and the development of teaching and learning materials are seen through the prism of the history textbook controversies. Critics such as Nishino (2008) argue that the Ministry of Education process has restricted smaller educational publishers and has maintained oligopoly practices. Nishino (2008) also claims that 'while Monbusho (Ministry of Education, Science, Sports & Culture) remained neither wholly responsible for the content nor the ideology in the texts, it continued to maintain control over the texts that have caused many domestic and international controversies over the last decades'.

Despite these criticisms, textbooks play a prominent role in the Japanese education system. Teachers are free to develop their own teaching and learning materials customised for the needs of their students. They also have access to government-funded, privately published textbooks and teachers' guides that have been trialled in classrooms to meet the needs of students and teachers. These materials are available for all curricula and subjects of study. They are used significantly in classrooms to support teaching and learning. Japanese textbooks are acknowledged internationally to be the leading texts for promoting student achievement and learning because they benefit from significant trialling and use by teachers and students, often through lesson study.

What are the major sources of classroom teaching and learning materials in the Netherlands?

The Netherlands and Canada have somewhat similar performances in the PISA student evaluation to that of Australia, as can be seen in Table 10. This table shows the relative performance of Australia, the Netherlands, Canada and Finland in the 2009 PISA evaluation.

Table 10 Australian, Canadian, Dutch and Finnish 2009 PISA results

Mathematics	Science	Reading
1. Shanghai – China 600	1. Shanghai – China 575	1. Shanghai – China 556
2. Singapore 562	2. Finland 554	2. Korea 539
3. Hong Kong – China 555	3. Hong Kong – China 549	3. Finland 536
4. Korea 546	4. Singapore 542	4. Hong Kong – China 533
5. Chinese Taipei 543	5. Japan 539	5. Singapore 526
6. Finland 541	6. Korea 538	6. Canada 524
7. Liechtenstein 536	7. New Zealand 532	7. New Zealand 521
8. Switzerland 534	8. Canada 529	8. Japan 520
9. Japan 529	9. Estonia 528	9. Australia 515
10. Canada 527	10. Australia 527	10. Netherlands 508
11. Netherlands 526	11. Netherlands 522	11. Belgium 506
12. Macao – China 525	12. Chinese Taipei 520	12. Norway 503
13. New Zealand 519	13. Germany 520	13. Estonia 501
14. Belgium 515	14. Liechtenstein 520	14. Switzerland 501
15. Australia 514	15. Switzerland 517	15. Poland 500
16. Germany 513	16. United Kingdom 514	16. Iceland 500

One of the major points of difference in the results is that Canada, the Netherlands and Finland are countries whose performances in PISA 2009 can be categorised as having high average performances and high social equity, with a socially equitable distribution of learning opportunities. In contrast, Australia is seen as having high average performances, but with large socioeconomic disparities, and is considered in the group of countries where there is strong socioeconomic impact on student performance. In the words of Andreas Schleicher, Special Advisor to the Secretary-General on Education Policy, OECD:

When you look at the distribution of student performance within each country, there are some countries in which social background has a strong impact on student performance, in other words, where educational opportunities are very unequally distributed (such as Australia), where there is a large gap between winners and losers and where a lot of the potential that children bring with them is wasted. There are other countries, where it matters much less into which social context students are born, where outcomes are more socially equitably distributed (such as Finland, Canada and the Netherlands).

(Schleicher, PISA 2009 Evaluating Systems to Improve Education)

Finding 3 outlined the changes that the Dutch government has made in funding teaching and learning materials. A sum of €325 (2011) is provided per secondary student for each school as part of its global budget so that teachers and schools can access classroom teaching and learning materials that they identify as meeting the student learning needs. This expenditure is independent of spending by the government on digital learning resources, and is designed to increase equity and the flexibility of teachers to meet student learning needs.

How do Finland, Japan and the Netherlands support their national curriculum with classroom teaching and learning materials?

All three nations provide digital learning resources, and fund print materials such as textbook and teachers' guides. In Finland and Japan, governments provision teaching through not only specific policies, but also funding textbooks and teaching and learning materials that support learning.

The print materials are produced by private publishers, and teachers and schools are free to evaluate and select textbooks and teaching and learning materials.

Printed teacher guides support teachers in lesson planning and the development of pedagogical approaches. Textbooks and teacher guides also assist teachers in developing zones of proximal development (Vygotsky, 1978) – learning environments in which student learning takes place. Lessons are not dominated by slavish adherence to textbooks, but are supported by teaching and learning materials that are seen as vital aspects of teaching and learning.

Teachers often develop their own materials and teaching and learning activities to meet the specific learning needs of their students. However, teaching is supported by available and funded textbooks for each classroom.

These education systems acknowledge the role of print-based textbooks and teaching and learning materials in student achievement and successful pedagogy. The education systems of Finland and Japan enshrine teacher autonomy in practice, especially in the design of professional learning, and the selection, modification and use of textbooks and teaching and learning resources.

The Japanese and Finnish education systems have developed a national curriculum. Their teaching and learning materials are produced and funded for each classroom to support the implementation of the national curriculum.

A key feature of these education systems is the provision of high-quality textbooks and teaching and learning materials that promote student conceptual learning and understanding, support a wide variety of pedagogies, and foster student engagement and construction of meaning in the national curriculum.

Finding 10

Spending on ICT resources is crowding out spending on other non-digital classroom teaching and learning resources

What is the digital context of education?

Internationally, education systems and schools are investing increasingly in the use of Information and Communication Technologies (ICT) for school and classroom use. Most national and state education systems are developing national and system-wide plans for how technology should be used in schools to improve learning, and have a positive and motivating impact on teaching and learning.

Schools are gaining increased access to ICT resources from student personal Internet access; school intranets and individual and class repositories; online individual learning plans; access to school resources and information delivered online at home or school; enhanced interfaces with homework and assessment tasks; provision of laptops, notebook computers and tablets (such as the iPad); emailing and learning management tools and blogs; and secure chat forums. Interactive whiteboards, social-networking opportunities and online learning and learning management systems (LMS) are also increasing the ability of schools to embed technology in learning and even personalise the learning process.

In this context new models and training systems for measuring and encouraging e-maturity and digital competence are being introduced into education systems and schools. There is an increased focus on teachers developing new pedagogies in their use, and embedding ICT in the classroom. Many nations are also establishing digital education repositories, specifically to provide a portal for digital learning resources produced by education systems and teacher community of practice groups.

What are current expenditures on ICT in Australian schools?

Digital learning is a popular political policy. In Australia, this trend culminated in the Digital Educational Revolution policy of the incoming Labor Government in 2007. During the 2007 federal election campaign, laptop computers were described as the 'textbooks of the future'. Accordingly, the 2008–2009 Australian Federal Government Budget allocated over A\$1.2 billion, over a four-year period, to provide each student with computer access. The federal government expected that the student computer ratio would fall to 1:1 in 2011 for students in Years 9–12, although this has not yet been achieved and the roll out of devices continues. The original funding estimate for 2008–09 expenditure was A\$272 million. However, state governments argued successfully that the costs of servicing the computers provided by the federal government, as well as software and support costs, had been neglected in the original funding proposal, and that the funds allocated to provide each student with a computer rose rapidly.

Even with an annual national allocation of A\$272 million (without increased funds for states to support servicing, software and support), the amount spent on ICT resources by the federal government exceeded the total print and software primary and secondary sales by the educational publishers by 80%. State governments were expecting that each student in a government school would receive a \$500 laptop computer in the near future. In New South Wales, for example, this expenditure is more than 15 times the 2007 investment in primary sales per student on other teaching and learning materials and textbooks published by education publishers; and more than 10 times in secondary sales per student. Students are going to have increased numbers of computers, but far fewer printed books, than previously noted. This is at a time when Australia's performance on reading in PISA is falling significantly (McGaw, 2009).

In determining spending on ICT, it should be noted that state governments also invest in ICT resources for schools, with significant investments in connected classroom programs, and the purchase of new technologies to increase access to learning sites and objects and interactive whiteboards. In addition, significant funds are invested from school global budgets in teacher professional learning in the area of ICT. The funding quantum for ICT in many states is significant, in addition to the federal funding. Research on private school spending, shows that book-list schools often spend up to A\$500 per student for ICT support, maintenance and professional learning. ICT levies are also becoming increasingly common in schools. These figures dwarf spending on other teaching and learning materials by a factor of 12 in primary schools and 6 in secondary schools.

ICT and print classroom teaching and learning materials: are they competing or complementary?

Despite the embrace of digital learning resources and technologies, 'very little research has been undertaken to compare how student achievement varies between groups using digital learning resources and groups using print resources' (Rollans & de la Chenelière, 2010).

Digital learning investment in both hardware and software is occurring without clear evidence that ICT spending increases student achievement. However, research indicates that ICT resources and digital learning hardware and software increase student interest and motivation (Skarin, 2008).

A major international survey of the effective use of ICT in schools (Skarin, 2008) reported that a critical factor related to the effective use of ICT in schools, is the existence of a strategy for ICT use that is linked to the pedagogical work inside the school and its classrooms, not on access per se. This is a finding that echoes many studies on the introduction of laptops in schools. For their use to be effective, the access to the digital learning resources needs to be considered in relation to the ways they are used; and the ways they are used need to reflect teacher beliefs about learning and subject matter and professional development.

A number of studies in relation to student achievement and ICT use in British homes report that 'it is not access to or general use of ICT that has an impact on attainment; rather attainment is determined by how the technology is used' (Skarin, 2008). This finding is echoed in a number of research studies into student achievement and ICT use.

Laptops are not textbooks. They coexist in the learning environment with textbooks and teaching and learning materials.

In 2010 the US Department of Education published a major meta-evaluation of online learning (Means et al., 2009). The meta-evaluation found:

On average, students in online learning conditions performed better than those receiving face-to-face instruction. The difference between student outcomes for online and face-to-face classes – measured as the difference between treatment and control means, divided by the pooled standard deviation – was larger in those studies contrasting conditions that blended elements of online and face-to-face instruction with conditions taught entirely face-to-face. Analysts noted that these blended conditions often included additional learning time and instructional elements not received by students in control conditions. This finding suggests that the positive effects associated with blended learning should not be attributed to the media, per se. An unexpected finding was the small number of rigorous published studies contrasting online and face-to-face learning conditions for K-12 students. In light of this small corpus, caution is required in generalising to the K-12 population because the results are derived for the most part from studies in other settings (e.g., medical training, higher education) (Means et al., 2009).

The policy to provide laptops and netbooks to senior secondary students – the heart of the Digital Education Revolution – has been welcomed by many in education, not the least in book-hire and class-set schools. This is because more than a hundred book-list schools had already provided laptops to entire year student cohorts in the last decade. Most educators believe that schools should have access to the technologies of the office and the work place to align schools to an emerging innovation and knowledge-based economy. Digital learning (Sawyer, 2006) based on computers is seen as the basis of a 'radical transformation of classroom cultures in the service of improved education' (Cole, 2010). However, many teachers are concerned about the Digital Education Revolution and, like Cuban (2010), are suspicious of claims that new technology is going to transform education. Alternative descriptions to laptops being the 'textbooks of the future' that have been offered by many teachers include 'scrapbooks of the future', 'colouring books of the future' and 'moving books of the future'. In some cases, teachers report that providing laptops is like providing a library on a student desk. Hattie's meta-evaluation of meta-evaluations (2009) has recorded very low effect sizes for the impact of ICT on student learning and development.

Print textbooks and teaching and learning materials have been designed to support learning environments; ICT provides digital resources and new communication channels for networking that need to be mediated, developed and transformed by teachers to support teaching and learning in classrooms.

Although the education systems of Japan, Holland and Finland have well-developed ICT in schools and fund ICT digital learning resources to a similar extent to Australia, ICT investment has not been undertaken at the expense of print teaching and learning materials for classrooms.

In the Japanese, Dutch and Finnish education systems there is an acknowledgement of the limits of ICT in creating learning environments. In these systems, ICT is not seen as an alternative or competitor to current pedagogy and the creation of teaching and learning environments in which learning takes place, but as complementary to them. Many Japanese lesson study groups have demonstrated that technology-rich environments have no impact on student achievement, but influence motivation for learning. Jason Epstein (2001) has pointed out that 'new technologies do not erase the past, but build on it'. Changes in the classroom teaching and learning resource environment occur through a complex complementarity that supports different types of educational ecology.

Many studies of computer use in schools and classrooms confirm that current print and digital teaching and learning resources are complementary. Some subjects in a secondary school will use digital learning resources more successfully and frequently than others, but will also use non-digital classroom teaching and learning resources. Despite the significant amounts spent by governments and communities on equipping schools with ICT and other technologies, changes have been gradual and spasmodic, reflecting a ragged borderline of adoption, use and implementation. Schools offer both print classroom textbooks and teaching and learning materials, as well as digital learning resources and environments, usually within the same classroom.

Print textbooks provide one mode of learning with which students and teachers are familiar and comfortable. The traditional classroom, and its photocopies, textbooks and teaching and learning materials, thus represents one delivery platform and learning environment. Learning objects and other digital learning resources, such as web-delivered online learning environments, offer another significant complementary learning-delivery platform. Both learning environments support and inform each other. Online materials enhance and add to knowledge. Print textbooks scaffold and frame knowledge requirements. Although it is expected that more and more online learning environments will also scaffold and frame knowledge, while personalising the learning experience. Separate and dislocated learning objects will become less useful as cohesive frameworks for digital learning are developed.

Artists tell us that form and content are not fully divisible. A textbook's design and the knowledge it presents interact in the medium of its pedagogical design. Shulman (1986), in a seminal approach to teaching and learning, suggested that teachers develop pedagogical content knowledge. This is specialised knowledge that teachers use to interpret students' prior learning, the concepts that students will find difficult, the most appropriate teaching strategies and the resources most useful in teaching. Pedagogical content knowledge arises from the teachers' need to represent and teach their subjects to children. This knowledge consists of three components: knowledge of the subject matter, knowledge about students and their characteristics and the school, community and classroom context in which the learning takes place. Pedagogical content knowledge embodies, invokes and focuses on 'those aspects of the subject that are most germane to its teachability' (Shulman, 1986). This knowledge includes the most regularly taught topics, the most useful forms of representation, most successful analogies, demonstrations, examples and illustrations, and the ways of making the subject familiar and understandable to others (Horsley & Lambert, 2001).

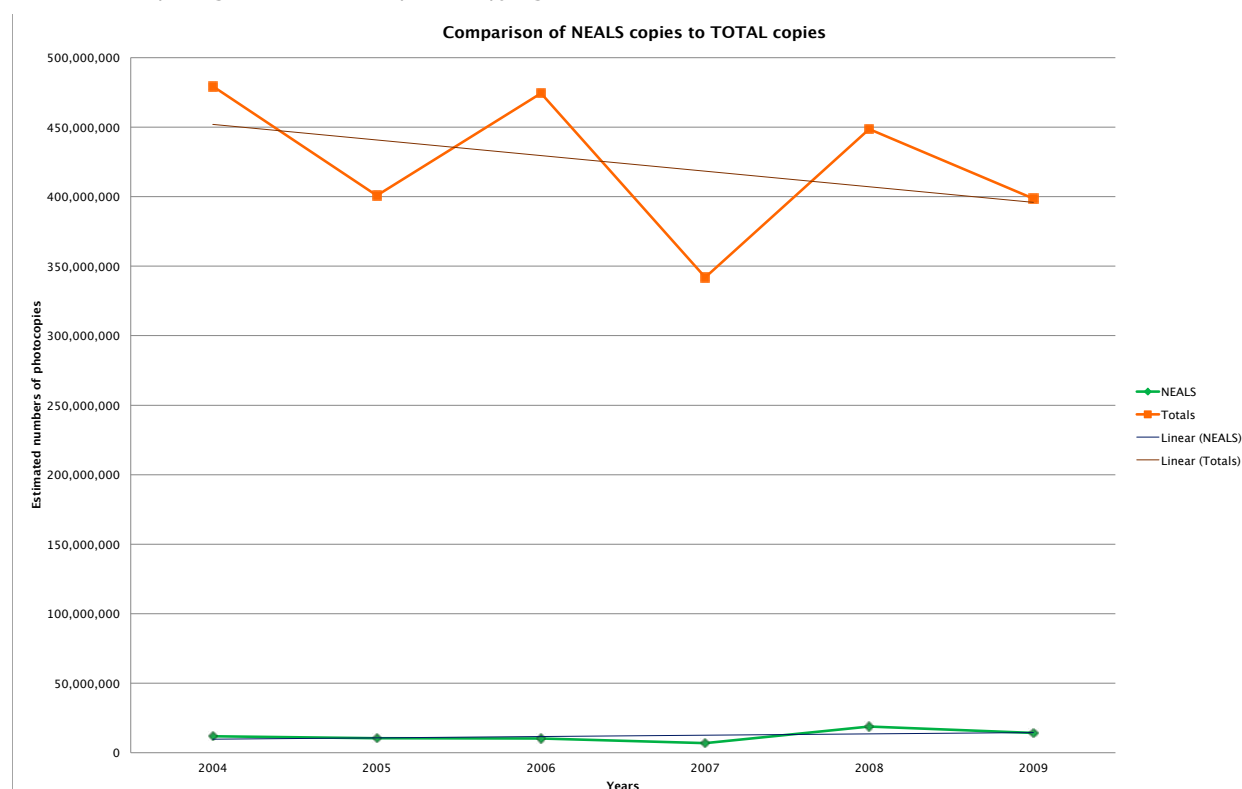
Currently that design is based around the school site's capacity to engage learners with teachers in classrooms. Print textbooks scaffold major concepts and develop students' schema, activate prior learning and assist students to construct and develop meaning in the topic under study. As a result, modern print textbooks represent pedagogical explorations of the subject matter in the curriculum. A current mathematical textbook, for example, contains clearly expressed outcomes, explanations, worked examples, problems, schematic maps, quizzes, activities and links between student experiences and subject matter. Such texts are supported by teacher workbooks, pedagogic approaches, websites and extension activities for diverse student abilities and interests.

What does NEALS data show us?

The data collected by CAL includes use of materials subject to the NEALS agreement. NEALS is a special National Education Access Licence for Schools that allows schools to copy, at no cost, material from educational websites and other materials published by many government bodies. NEALS operates in all Australian states and territories, except Victoria. The parties to the NEALS agreement have agreed that use of their works will not attract payment of remuneration under the statutory licence scheme. These materials comprise digital learning resources to support curriculum, teachers, schools and pedagogy, and provide professional development and classroom teaching and learning resources for teachers.

In some ways the NEALS' agreement and process provides a view of the features of a future digital education repository. The majority of school photocopying is from commercially published print textbooks that teachers have identified as containing the required knowledge and activity sources for their lessons. Very little is copied from NEALS' sources.

Data on NEALS copying for the period 2004–2009 is provided in Chart 5 on page 68. This chart shows the extremely low copying from NEALS' sources. This low copy rate continued in the 2009–2010 survey.

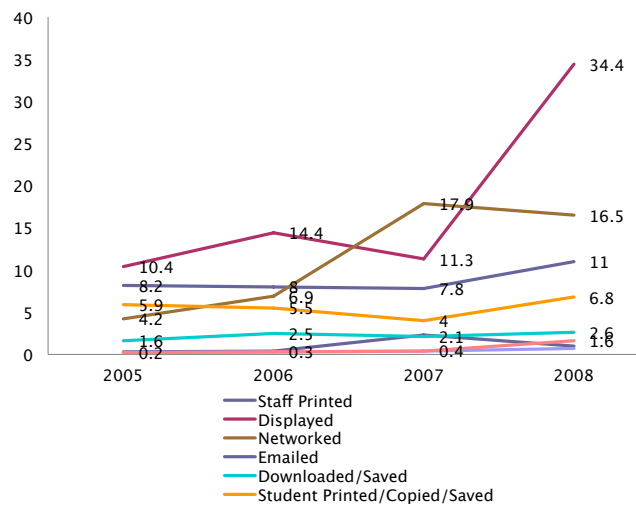
Chart 5 Comparing NEALS to total photocopying

Such digital repository material can only provide a small proportion of the classroom teaching and learning needs of Australian teachers. Print textbooks, in 2009 and 2010, were providing the basis of classroom teaching and learning resources that were photocopied.

What does EUS data show us?

CAL also collects data on digital copying and display (for example, on interactive whiteboards) from electronic sources in schools for educational purposes. Data are collected through surveys of samples (by teachers in the nominated schools) of the schools' records of their electronic use of copyright (EUS) material. The survey records are uploaded to a purpose-devised EUS website. In developing the survey and the records, the concept of a single copyright 'item' is used. An item that is recorded is a single instance of copying a single 'piece' of content and using it in a single way. The example given in the survey protocols is 'five pages sourced from a website that has been emailed to twenty people' (AMR Interactive Report, 2009). To obtain the total multiplied pages reported in the results of the EUS survey, the number of pages of sourced content is multiplied by the number of copies of that content. (See Chart 6 on page 69.)

Chart 6 *Electronic use of copyright (EUS) material page rate for activity type*
Trend analysis of weighted annual student page rate for valid items by activity type



The data in Chart 6 shows that most categories/activity types remained constant over the period of the survey, with the exception of staff copying, printing and display. The increase in staff printing can be seen as reflecting the flexibility of teachers in printing material directly for their classes, adding to the flexibility of the Australian system that allows teachers to develop classroom teaching and learning resources to meet student needs. The extensive increase in display reflects the increasing use of interactive whiteboards to display web items and electronic resources produced by educational publishers.

In terms of providing materials for students in classrooms, the NEALS and EUS data both show that teachers have even more flexibility in accessing and providing classroom teaching and learning resources for their students, but that photocopying from textbooks and print textbooks and teaching and learning kits remains the main strategy used to provide learning resources for students.

Despite the extensive investment in digital learning resources accompanying the digital learning revolution and state government and school investments in these digital resources, print resources remain the dominant format of classroom teaching and learning resources and will remain so. Australian teachers respond to the diverse learning needs of individual students; and for many students, that means print-based classroom teaching and learning resources. According to Rollans and de la Chenelière (2010), 'teachers also have diverse preferences and, despite the generational shift towards digital preferences ... many teachers strongly prefer print resources'. Providing classroom teaching and learning resources for the future will depend on the extent to which local school and teacher autonomy allows teachers to access the resources they prefer to meet the learning needs of their students.

What new research is needed in the digital learning environment?

Although digital learning and enhanced technology-supported learning seem to herald great promise and provide a 'magic bullet' for educational problems, there is limited evidence of the effectiveness of educational technologies on student outcomes. Many teachers are concerned about the impact of online reading in reducing the speed of reading, making reading less accurate and shortening the time that students spend reading. Many teachers are also worried about the distraction provided by online reading environments, where new links and connectivity make extended reading more difficult and problematic. Although connectivity maximises access to information and allows new ways of interacting and learning, the surfeit of information makes turning it into knowledge for students more problematic.

Print and digital textbooks and digital educational repositories: a case study of the Netherlands

Commercially produced print textbooks and their digital support materials play a critical role in education in the Netherlands. Almost every Dutch teacher in primary and secondary education uses textbooks in almost every school subject (Reints, 2011). The majority of teachers use other learning materials, such as digital materials, as well. To understand the use of classroom teaching and learning resources in the Dutch education system, each year the Ministry of Education conducts a survey with a representative sample of 1200 teachers, to ascertain the frequency of use of different types of classroom teaching resources. This is shown in the following table (Reints, 2011).

Frequency of use of textbooks in 2010

	Primary education (%)	Secondary education (%)
Only textbooks	5	5
Mainly textbooks	83	77
Mainly own materials	5	5
Only own materials	0	4

Some teachers also adapt and modify textbooks, sometimes by replacing sections with their own classroom-up teacher-made print and digital learning materials. They sometimes use textbooks in planning and organising their lessons. Textbooks are used for explaining content, making assignments and to give homework to read or make textbook assignments. The textbook is a guideline for teachers, which normally will be followed rather strictly (Reints, 2011).

The Netherlands Ministry of Education has also developed digital educational repositories to stimulate the development and the use of digital learning materials for schools. One repository is *Kennisnet*, which collates details and information about digital materials and displays it to inform teachers about the efficacy of the digital materials (see www.kennisnet.nl). Another repository is *Wikiwijs*, which provides an online platform where teachers can upload, adapt and download digital materials. The *Wikiwijs* site databank has several hundreds of thousands of pieces of material (see www.wikiwijs.nl).

Reints reports that 'online issues are quality of digital learning materials, copyrights, tools for authors to design digital learning materials and a course for students of higher education to arrange and design digital learning materials' (Reints 2011).

Although there is an extensive supply of digital learning support materials available from these repositories, research conducted annually has found that the individual classroom use of digital materials from the repositories and other sources have not risen appreciably in the last few years. Each year the Ministry of Education conducts a survey with a representative group of teachers about their use of digital learning materials and the digital repositories.

Reints (2011) has provided the conclusions of the 2011 survey. 'The main conclusions of the 2011 national survey were that:

- teachers reported that they seldom found the classroom/lesson resources they were looking for
- one-third of the teachers developed digital materials themselves for some of their classes

- one-sixth of classroom materials used in the classroom had a digital origin, but that this proportion had remained constant for many years
- the actual use of teacher-made classroom up materials in class lagged far behind textbook use.'

The following table from the survey identifies the limited planning time that determines greatly the types of classroom learning materials that are used and how they are use.

Reasons for limited classroom use of digital learning materials

	Primary education (%)	Secondary education (%)
Lacking infrastructure	66	65
Limited time for development and use	54	69
Lack of training	60	49
Lack of collaboration	44	35
Inadequate teacher education	35	25
Otherwise	12	7

Finding 11

The education publishing market's capacity to build on its strengths in providing high-quality classroom teaching and learning materials (in both print and digital formats) to meet new learning and curriculum needs, and to also overcome current equity challenges, requires new policy settings and support

How to design educational publishing markets to achieve social and educational equity policy goals?

Many government social and cultural policies revolve around the question of how to restructure and redesign markets to achieve multiple social policy goals and aims. Answering this question requires governments to construct a policy and regulatory framework to structure markets more effectively. At the core of the restructuring and redesigning will be policy and regulatory settings that allow market suppliers to better provide goods and services to meet the needs of the market and, at the same time, promote equity and efficiency.

The key horizontal and vertical equity challenges that have arisen in the current educational publishing market as a result of the way the school system is funded and operates require new policies to promote equity. One of the outcomes of 2009's PISA results is the recognition that Australia needs to further develop policies in relation to overcoming socioeconomic impact on student performance.

The Australian educational publishing industry is a key social, cultural and educational industry whose mission is to produce high-quality print and digital classroom teaching and learning resources. It has evolved to meet the needs of teachers, learners and schools in the Australian context. One of its key features is the strength of competition, which allows multiple Australian teacher-authors in each market niche to produce new and refined classroom teaching and learning materials, continually, that are purchased and valued by teachers and schools through the educational publishing market.

Inequity in the way that schools are funded has limited the demand by certain schools for these materials. The Australian copyright statutory licensing system revenue stream allows Australian educational publishers to continue to provide high-quality classroom print and digital teaching and learning materials to meet the needs of the teachers and the schools that comprise the educational publishing market. In addition, the current market structure in classroom teaching and learning materials ensures that purchasing and decisions about resources to be used in schools and classrooms are determined by the schools and teachers themselves.

This report has provided evidence that there is significant inequity in the provision of print and digital learning resources in Australia. Perhaps a way forward in restructuring the current classroom teaching and learning resource market is to adopt a variation of a similar policy introduced in the Netherlands (see the Netherlands Case Study in Finding 10, on pages 70–71). These include:

- Considering print and digital classroom teaching and learning resources as complementary and funding both of them.
- Providing schools with a per student allocation for commercially produced print and digital teaching and learning resources to be used at the discretion of the schools. In the Netherlands this was €360 in 2010; and €325 in 2011.

What policies can be developed to reduce inequity through developing benchmark funding to support the demand by teachers and schools for quality print and digital classroom teaching and learning materials?

In the United States, the Market Data Retrieval (MDR) group calculates US public school expenditures on education. Here, public schools educate 95% of the school population. Total expenditure for the 2006–2007 school year was approximately US\$413 billion. Of this total, approximately US\$12.5 billion was spent on instructional materials (classroom teaching and learning resources), including textbooks, textbook repairs, workbooks, magazines, newspaper subscriptions, purchases of teaching supplies such as chalk, whiteboard markers and crayons. Included is software and educational media supplies. Excluded is ICT, computer and other media hardware. The proportion of total funding in US public schools allocated to instructional materials is approximately 3%. The MDR data for 2006–2007 for New York State show total spending at approximately US\$37 billion, with spending devoted to instructional materials totalling US\$0.92 billion, a proportion of 2.48% of total spending. The Table 11 shows US national spending on instructional materials per student for the period 2003–2007.

Table 11 Instructional materials spending per student in the United States for 2003–2007

Year	Instructional material per student nominal (US\$)
2003	220
2004	227
2005	237
2006	247
2007	258

Applying the US proportion of spending on instructional materials of 3% to Australia would equate to per capita spending of A\$240 per primary student and A\$300 per secondary student, based on 2007 AGSRC recurrent cost figures as noted in the Review of Funding of Schooling Discussion Paper.

- 1 When comparing spending on textbooks and teaching and learning resources between Australia, Finland, Japan and other OECD countries (based on publishers' sales and municipal spending data), the findings reveal that Australia lags behind in spending in all comparator nations (using 2007–2008 Australian dollar exchange values). Spending is only 27% of that of Finland. Using Finland and France as comparators would require Australian investment in teaching and learning materials to be increased by something in the order of 300%, approximately A\$100 per primary student and A\$190 per secondary student.
- 2 Rorris (2008) estimated a current funding gap between investment in facilities for Australian public and private schools. An inequity index was constructed, based on detailed cost analysis of capital expenditures using the latest national data. Rorris then developed a Capital Investment Gap (CIG) as the basis of setting investment targets to rebuild public schools. A similar approach is possible based on data presented in this report. Given the inequity identified in sections of this report, new investment could be based on ending inequity between private and public schools by increasing funding for public schools, based on a classroom teaching and learning materials educational disadvantage index.
- 3 Each level of government in Australia has developed specific school-funding policies to redress the disadvantage of low SES location. In particular, a number of states developed specialised low SES supplementary funding formulas that provided increased funds for poor schools in poor locations. In New South Wales, for example, for many years the state government has funded additional resources for needy schools, as measured by low SES status. The Federal Government's Education Revolution builds on this trend through its planned Low Socioeconomic Status School Communities National Partnership funding, designed to deliver A\$1.9 billion of **extra** resources to low SES schools

over a four-year period. States have identified more than 800 schools to participate in this program, which is linked to the teacher quality and literacy and numeracy initiatives in the Smarter Schools National Partnership Program. A specific feature of this additional funding is to promote the federal government's reform agenda to attract high-performing teachers and principals; adopting best practice performance management; encouraging school practices that promote innovative and tailored learning opportunities; strengthening school accountability; and promoting external partnerships to expand services.

This report has argued that specific investment in individual classroom teaching and learning materials is required, especially in low SES schools. Currently the states and the Commonwealth are implementing funding plans for the National Partnerships in Low SES schools for 2009–2013. One vehicle for increased investment in individual classroom teaching and learning materials is low SES national partnership funding plans. Implementation of benchmarks could be accomplished through this investment process.

How to develop policy setting to strengthen the educational publishing market as Australia resources the Australian Curriculum?

Australian educational publishing is a key component of a key cultural industry – the Australian book industry (Book Industry Strategy Group: Final Report to Government 2011). Educational publishers' sales of print and digital learning materials constituted 35% of the sales of the entire Australian book and publishing industry. More importantly, educational publishers are the main producers of teaching and learning materials for students to read and use, written by experienced and high-quality teachers.

The market for these materials has developed in alignment with Australia's unique teacher model of individual teacher classroom-up development of teaching and learning materials for their class, as teachers try to meet the learning needs of their students and in many cases are unable to afford print and digital textbooks for each student. The print and digital textbooks and teaching and learning kits and supplementary materials that are produced by commercial publishers are critical to the cut-and-paste, click-and-paste and download-and-drag approach that Australian teachers use to create their own classroom teaching and learning resources.

Commercially produced print and digital resources are a critical source for teacher creation of individual classroom teaching and learning resources. Policy changes and investments should strengthen the market for educational publishing that is currently driven by teacher and school demand.

Investments in centralised resources, such as 'C2C' in Queensland and the Digital Education Repository being developed by Educational Services Australia, are welcomed as providing additional resources. However, continued investment in centralised teaching and learning resources needs to be balanced against investments directly to schools that will support the current market for educational publishers and support the current model of individual classroom teacher development of classroom teaching and learning materials. Changes in current policy settings need to balance different types of investments and strengthen Australia's dynamic educational publishing industry, rather than weaken such an important market that supports teaching and learning in Australian classrooms. The balanced investment in the Netherlands provides a useful frame for developing balanced investment in teaching and learning materials that empowers teachers, strengthens educational publishing markets and promotes equity.

Should educational publishers be important educational stakeholders?

Educational publishers are the main providers of print and digital teaching and learning materials that students read and teachers use in the classroom. In many OECD countries this role is seen as an important component of the education system. As a result, in many OECD nations, educational publishers are included as a key stakeholder in curriculum change, educational funding systems and educational reform.

The more in-depth consultation undertaken with key stakeholders would allow educational publishers to support curriculum change more efficiently, provide advice in relation to key curriculum reforms and their design and implementation. A higher-priority stakeholder status would allow publishers knowledge of how teachers resource their lessons and use teaching and learning materials to more easily shared among other stakeholders. Anticipated outcomes from promoting educational publishers as a more important stakeholder include new collaboration and strategic alignment with education systems and schools, and new ways of supporting teachers and schools in implementing the Australian Curriculum.

The Digital Education Advisory Group established by the Australian Government to advise on transforming schools with technology is warmly welcomed. However, individual classroom teaching and learning resources are also provided by current commercial print and digital publishers and the photocopying system that supports individual classroom teacher customisation of these print and digital resources. The work of the Digital Education Advisory Group needs to be supported through other structures that promote Australia's educational publishers as a significant stakeholder in supporting classroom teaching and learning resources.

How should more research on classroom teaching and learning materials be promoted?

This report has overviewed the small corpus of research on print textbooks and teaching and learning materials and the use of photocopying by Australian teachers. The bulk of research in Australian education into teaching and learning resources has focused on the possibilities of digital technologies in the classroom. Much of this research effort has ignored the actual classroom teaching and learning resources that are used by teachers in the classroom.

This research has reported on the annual surveys undertaken with teachers about the use of different types of classroom teaching and learning materials at the request of the Ministry of Education in the Netherlands. The research is acknowledged in the Netherlands as important in guiding policy development in the provision of commercially published print and digital materials and the educational digital repositories developed by the Ministry, and in undertaking investments into classroom teaching and learning materials that promote equity.

In a similar way the Korean Institute of Curriculum and Evaluation (KICE) conducts research into the use of textbooks and the development of digital learning materials to support learning. The Japanese Textbook Research Center plays a similar role in Japan.

This report concludes with a plea for more research to be conducted on all of the classroom teaching and learning materials that Australian teachers use to support the classroom learning and development of their students.

4 Appendices

Appendix 1 Research and data sources

Data for this report is presented from eight sources.

- 1 A detailed analysis has been made of the sales of educational materials by Australian educational publishers to Australian schools from 2002 to 2010. This data is collected by the APA as a result of a monthly survey compiled from sales by educational publishers of textbooks, literacy and numeracy kits, educational software, reference materials and library series. This data has been analysed to reveal average spending by primary and secondary schools, on a state-by-state comparison, and nationally. In addition, this sales data has been adjusted for price inflation to further determine real spending trends between 2000 and 2010.
- 2 Data on commercial sales of educational materials to schools has been collected from international publishers' associations. The report provides analysis of 2006 commercial sales of educational materials to schools, with data drawn from the German, French, Danish and Norwegian publishers' associations. This data is then compared with Australian sales of educational materials to schools on a comparative international per capita basis.
- 3 A detailed analysis has been undertaken of photocopying in Australian primary and secondary schools. CAL conducts a nationwide survey of photocopying in the schools of each Australian state over a two-year rolling survey period. Summaries of this data are usually included in CAL's annual reports, which are published on its website. Such data is used to provide school photocopying data per student and national totals of photocopying per student, for the years 2004–2010. This data has been augmented by some small-scale studies of teacher use of photocopied pages from the late 1990s and early 2000s.
- 4 A detailed analysis of Australian primary and secondary school annual reports to the community from each Australian state has been undertaken between 2007 and 2008. Schools and states and educational systems differ in the detail they provide in annual school reports. The data in many cases is not comparable. However, some estimates of expenditures on classroom teaching and learning materials can be made through accessing the financial details provided in annual school reports. In particular, differences in per student spending on classroom teaching and learning materials among schools that provide this data can be reported. The Australian Scholarships Group's 2007 report on the cost of fitting-out children for the 2007 school year was also analysed to explore a cost index of textbook spending.
- 5 Comparisons between spending on classroom teaching and learning resources between Australia, Finland and Japan were developed. Using APA sales figures, and spending figures from Finland's educational regions and Japan's Ministry of Education, a comparative spending analysis was developed.

In addition, an analysis and explication of the role of classroom teaching and learning materials in Finland, the Netherlands, Australia and Japan were undertaken. This comparative review of classroom teaching and learning materials was undertaken in response to Finland's and Japan's leading performances in PISA student achievement assessments.

- 6 A number of teacher education reviews and reports were analysed in relation to discussions, findings and recommendations relating to classroom teaching and learning resources. These are detailed in the report reference list.

- 7 Research from the Teaching Resources and Textbook Research Unit (TREAT) at the University of Sydney is reported. This research explored:
 - how teachers resource a new curriculum
 - how student teachers use textbooks and other teaching and learning resources during practicum
 - the differences in teaching and learning and textbook resources between government and leading private schools in New South Wales.
- 8 Research presented at conferences of the International Association for Research on Textbooks and Educational Media (IARTEM) is also referred to. Individual papers are listed in the reference section.

Appendix 2 The teacher survey from the evaluation of pedagogy in basic education 2007 Finland (Atjonen et al. 2008)

Evaluation of pedagogy in the basic education 2007

Teacher Survey

The Educational Evaluation Council

03/15/2007

Best teachers

The Educational Evaluation Council has been commissioned by the Ministry of Education to evaluate the pedagogy of the basic education and the need to develop it. Of central interest are the principles that are important for teachers in their teaching and in education and the opportunities to realise these principles.

This teachers' survey is a part of the material the evaluation will be based on. In addition, there will be visits to some schools. The evaluation is made by an evaluation group set up by the Educational Evaluation Council*, consisting of teachers, representatives of educational administration and researchers in educational science. Based on the collected material the evaluation team will make a report which also includes suggestions for development. The suggestions will affect all parties responsible for development of basic education, schools, school authorities, educational administration and teacher training.

We need your expertise and your experience. The inquiry consists of both open-ended questions and multiple choice questions. Try to answer briefly and concisely so that the answers fit in the boxes reserved for this. Unless otherwise specified, the issues concern the state of affairs when you answer the inquiry. Please return the questionnaire form in a sealed envelope to the principal, who then sends the envelopes in a joint response to the Council.

Questions about the inquiry and the evaluation may for the Swedish education be directed to the planner NN at the Council for Education Evaluation. Also the main planners NN and NN will answer any questions.

Your answer will be treated confidentially. Data will not be reported on an individual level or on a school level. The key results of the evaluation will be sent to schools at the beginning of 2008.

Many thanks for your contribution! Have a nice spring!

The Council for Education Evaluation

Planning and Evaluation Group

* The Educational Evaluation Council is an agency appointed by the Ministry of Education and is together with the Ministry of Education responsible for evaluating the training and the development of the teaching.

(A) Background information

A1 Gender 1 woman
 2 man

A2 Your teaching experience? approximately _____ years

A3 What is your teaching task at the moment? Circle the figure at the right alternative.

- 1 class teacher
- 2 fully employed without permanent position
- 3 lecturer or subject matter teacher
- 4 other teaching task, what? _____

A4 What grade do you teach **mostly**? Circle the correct option. If you are teaching a compound class, identify the compound class grades

Year 1 2 3 4 5 6 7 8 9

A5 Which of the following subjects do you **mainly** teach? Circle the numbers at the right alternatives. If you act as a class teacher, circle the numbers of the subjects you teach.

- 1 Mother tongue (Finnish)
- 2 Mother tongue (Swedish)
- 3 Mathematics
- 4 Physics
- 5 Chemistry
- 6 Geography
- 7 Biology
- 8 Finnish
- 9 History
- 10 Music
- 11 Fine Arts

A6 How large in general are the teaching groups that you **mainly** teach? Circle the number that best meets your situation.

- 1 10 students or fewer
- 2 11-15 students
- 3 16-20 students
- 4 21-25 students
- 5 26-30 students
- 6 over 30 students

A7 How often have you been taken part in voluntary training for the enhancement of your skills (other than mandatory) from the beginning of the academic year 2004-2005 or during approximately three years?

- 1 not at all
- 2 1-2 times
- 3 3-4 times
- 4 5 times or more

(B) Principles and facts that are important for your teaching

- B1** What educational philosophy or pedagogical principles do you consider most important in your teaching?

- B2** If you have not been able to realize your most important pedagogical principles in some parts of your work, what circumstances usually prevent you?

- B3** Describe a lesson or teaching period, which you think has been particularly successful. Bring in your description with details such as goals, students, teaching methods and other factors that you believe to be important.

- B4** To what extent do the following factors prevent or impede you to implement a successful lesson or teaching period. Circle the figure in the alternative that best corresponds to your situation.

	Almost not at all	To some extent	Much	Very much
1 big differences in students' backgrounds (eg different language)	1	2	3	4
2 varying learning abilities and skills of students	1	2	3	4
3 the amount of special assistance needed by students	1	2	3	4
4 indifferent students	1	2	3	4
5 disruptive students	1	2	3	4
6 large number of pupils per teacher	1	2	3	4
7 lack of teaching materials	1	2	3	4
8 inappropriate teaching spaces	1	2	3	4
9 the amount of tasks other than teaching in class	1	2	3	4
10 the amount of the objectives in relation to teaching time	1	2	3	4
11 other, what? _____	1	2	3	4

(C) Planning of teaching and learning environments

- C1** To what extent do you consider the following aspects when planning your teaching? Circle the number at the option that best meets your situation.

	Almost not at all	To some extent	Much	Very much
1 variation among students and students' needs	1	2	3	4
2 students' gender	1	2	3	4
3 students' expectations and wishes	1	2	3	4
4 characteristics of the teaching subject	1	2	3	4
5 textbooks and accompanying workbooks	1	2	3	4
6 the national core curriculum	1	2	3	4
7 local curriculum (by school or school establisher)	1	2	3	4
8 opportunity for collaboration with other teachers	1	2	3	4
9 guardians' expectations of teaching	1	2	3	4
10 availability of teaching materials, etc	1	2	3	4
11 available teaching spaces	1	2	3	4
12 other, what? _____	1	2	3	4

- C2** If there has been some significant variation in the planning or realization of your teaching during the past five years, please describe briefly one or two essential changes.

(D) teaching methods, teaching materials and methods

D1 To what extent do you point out the following factors when choosing appropriate instruction techniques, working methods or arrangements for your teaching? Circle the figure at the alternative best suited to your situation.

	Almost not at all	To some extent	Much	Very much
1 students' opportunities to be active	1	2	3	4
2 interaction between students connected to aims	1	2	3	4
3 differentiation of teaching in various forms	1	2	3	4
4 opportunities to give students feedback	1	2	3	4
5 opportunities for students to self evaluation	1	2	3	4
6 opportunities for students to progress at their own pace	1	2	3	4
7 maintain good working atmosphere	1	2	3	4
8 that the goals of teaching are achieved	1	2	3	4
9 to develop students' thinking skills	1	2	3	4
10 that students' individual learning skills are developed	1	2	3	4
11 to develop students' practical skills	1	2	3	4
12 that pupils' social development is supported	1	2	3	4
13 that students' self-esteem is strengthened	1	2	3	4
14 education for tolerance	1	2	3	4
15 that students' knowledge capital systematically increases	1	2	3	4
16 that pupils' healthy growth and development is promoted	1	2	3	4
17 ability to supervise the studies (e.g. individually)	1	2	3	4
18 conformity with the teaching materials used	1	2	3	4
19 that the teaching is varied and versatile	1	2	3	4
20 homework to support learning in school	1	2	3	4
21 other factor, which? _____	1	2	3	4

D2 To what extent do you on a daily basis use following educational media or other materials to help you in your teaching? Circle the figure in the alternative that best meets your situation.

	Almost not at all	To some extent	Much	Very much
1 textbooks	1	2	3	4
2 work books and exercise books	1	2	3	4
3 teacher's manual	1	2	3	4
4 other books than in paragraphs 1-3	1	2	3	4
5 materials on the internet	1	2	3	4
6 newspapers and magazines	1	2	3	4
7 Learning Games	1	2	3	4

8	TV, VCR, DVD, etc. material	1	2	3	4
9	own worksheets	1	2	3	4
10	other materials , what? _____	1	2	3	4

(E) development of teaching and education

E1 Describe one or two major problems related to teaching or education that you have encountered during your teaching career! How did you solve it/them?

1st problem	The solution you found to the problem
2nd problem	The solution you found to the problem

E2 For which kind of issues do you need more support for your profession (training or other support that improve the skills) to develop your teaching (1-3 needs)?

E3 Describe a problem in the context of the national governance of education or in the regulations on education, which you consider important and the solution of which could significantly help you to develop your teaching.

Appendix 3 Defining teaching and learning materials

The meaning of textbooks and teaching and learning materials

This report defines textbooks and teaching and learning materials as textbooks, workbooks, teaching and learning kits, teacher reference materials, literacy and numeracy kits and teaching and learning packages, big books, three-dimensional mathematics objects, software and multimedia packages. Supplementaries, such as teachers' guides and teachers' resource packs and editions, CD-ROM supplementary activities and resources are also included. Reference material from such resources as atlases, dictionaries, novels, plays and anthologies and magazines and audiovisual materials used to support teaching and learning in classrooms is included.

Some of this range of materials is provided free to teachers and schools by community, non-government and government organisations and teacher associations. The bulk of such material is produced by commercial publishers.

How are textbooks and teaching and learning materials funded?

Commercially produced print and digital textbooks and teaching and learning materials are funded in a number of ways. State governments fund schools and make funding allocations that schools may spend on textbooks and teaching and learning materials. State governments may also fund specific allocations for the purchase of textbooks and teaching and learning materials. Some state governments allocate specific amounts to government and non-government schools for this purpose. Some school systems may allocate funds for the purchase of textbooks and teaching and learning materials. Parents are asked to make contributions to the purchase of textbooks and teaching and learning materials through general or specific schools levies that can be used to purchase textbooks and teaching and learning materials. Some schools and school systems also ask parents to fund the purchase of textbooks and teaching and learning materials that are provided to them as a list (the book-list system). Other funding processes, such as sponsorships, are available. Often the funding systems are combined, as when the state makes specific allocations and parents are still asked to pay levies and fees. In some situations the funding systems interact, where schools provide book lists for parents but the school also funds the purchase of textbooks. This report provides data on the total sales of textbooks and teaching and learning materials, costs reported by parents, and expenditures undertaken and reported by schools.

5 References

- Allen Consulting Group Report (2009). *Review of school based management in the ACT. Report to the Department of Education and Training*. Canberra.
- Angus, M., Olney, H., Ainley, J., Caldwell, B., Burke, G., Selleck, R. & Spinks, J. (2004). *The Sufficiency of Resources for Australian Primary Schools*, Report by Edith Cowan University, ACER, The University of Melbourne and Monash University.
- amrInteractive (2009). *2008 Australian Schools Photocopying Survey Annual Review: an amrinteractive report*. Sydney.
- amrInteractive (2009). *Electronic Use System. Annual Review Report 2007*. Sydney.
- Atjonen, P., Halinen, I., Hämäläinen, S., Korkeakoski, E., Knubb-Manninen, G., Kupari, P., Mahtäläinen, J., Riskuk, A., Salonen, M. & Wikman, T. (2008). *Tavoitteista vuorovaikutukseen. Perusopetuksen pedagogiikan arviointi. (From aims to interaction. Evaluation of the pedagogy of the comprehensive school)* Jyväskylä: Koulutuksen arviointineuvosto.
- Auditor-General, NSW (2004). *School Annual Reports: Performance Audit*. DET. Sydney.
- Australian Council of Deans of Education Incorporated (2004). *Submission to the Victorian Education and Training Committee, Inquiry into the suitability of pre-service teacher training courses*, ACDE Inc, Canberra, pp.1–11.
- Australian Education Union (2010). *State of our schools survey*. AEU: Victoria.
- Australian Scholarships Group (2007). *Costs for Fitting Out Your Child for Back to School in 2007 for Primary and Secondary Schools: A Research Report prepared by the Australian Scholarship Group*. Oakleigh, Victoria. pp. 1–23.
- Chowcat, I., Phillips, B., Popham, J. & Jones, I. (2008). *Harnessing Technology: preliminary identification of trends affecting the use of technology for learning*. Becta (www.becta.org.au).
- Baker, B. (2009). Within-District resources allocation and the marginal costs of providing equal educational opportunity: Evidence from Texas and Ohio. *Education Policy Analysis Archives*. Vol. 17, No. 3, pp. 1–28.
- Birkerts, S. (2006). *The Gutenberg elegies: the fate of reading in an electronic age*. Faber and Faber: New York.
- Braslavsky, C. (ed.) (2006). *Textbooks and quality learning for all: Some lessons from international experiences*, UNESCO. International Bureau of Education: Paris.
- Bruillard, E., Aamotsbakken, B., Knudson, S. & Horsley, M. (eds) (2007). *Caught in the Web or Lost in the Textbook*. Eighth International Conference on Learning and Media (International Association for Research on Textbooks and Educational Media). Caen: France: Ufm. Basse Normandie. IARTEM.
- Bruillard, E. (2009). Educational resources produced, exchanged, discussed by groups of teachers.
- Which consequences for IARTEM research? in Rodriguez, J., Horsley, M. & Knudsen, S. (eds) (2010). *Local, National and Transnational Identities in Textbooks and Educational Media*. Tenth International Conference on Learning and Educational Media (International Association for Research on Textbooks and Educational Media). Santiago De Compostela: University of Santiago. IARTEM.
- Butland, D. (2008). *Testing Times: Global trends in marketisation of public education through accountability testing*. New South Wales Teachers Federation: Sydney.
- Caldwell, B. & Harris, J. (2008). *Why not the best schools?* ACER Press.
- Caldwell, B. (2009). Education revolution fails grade. *The Sydney Morning Herald*, 2 November, 2009 (www.smh.com.au/national/education/education-revolution-fails-grade-20091102), date retrieved 2 November 2009.
- Chambliss, M. & Calfee, R. (1998). *Textbooks for learning: Nurturing children's minds*. Oxford: Blackwell.
- Clarke, D., Emanuelsson, J., Jablonka, E. & Chee Mok, I. (2006). *Making Connections: Comparing mathematics classrooms around the world*. The learner's perspective study. Sense Publishers: The Netherlands.

Cole, M. (2010). What's culture got to do with it? Educational research as a necessarily interdisciplinary enterprise. *Educational Researcher*. Vol. 39, No. 6, pp.461–70.

Commonwealth of Australia (2011). *Book Industry Strategy Group: Final Report to Government*. Department of Innovation, Industry, Science and Research.

Connors, L. (2007). *Making federalism work for schools: Due process, transparency, informed consent*. Sydney: NSW Public Education Alliance.

Coombes, B. (2008). *Australian School Libraries Research Project: A snapshot of Australian school libraries*, Report 1. Australian School Library Research Project, ASLA, ALIA & ECU (www.chs.ecu.edu.au/portals/ASLRP/publications.php).

Copyright Agency Limited. *Annual Reports* Sydney (www.copyright.com.au/Quicklinks/Download_Centre/Corporate_Publications/Corporate_Publications_1.aspx).

Cuban, L. (2010). *Larry Cuban on school reform and classroom practice* (<http://larrycuban.wordpress.com/>).

Crawford, K. (2006). School History Textbooks Across cultures: international debates and perspectives, *Oxford Studies in Comparative Education*, pp. 93–105.

DEEWR (2008). *Digital Education Revolution National Secondary Schools Computer Fund*. Commonwealth of Australia (www.digitaleducationrevolution.gov.au). Canberra.

DEEWR (2008). *Digital Education Revolution Strategies for Realising the Vision of Connectivity for Australian Schools*. Commonwealth of Australia (www.digitaleducationrevolution.gov.au/broadband/implement_approach.htm) Canberra.

DEEWR (2008). *Towards a National Vision of Connectivity for Australian Schools. Digital Education Revolution National Secondary Schools Computer Fund*. Commonwealth of Australia (www.digitaleducationrevolution.gov.au/features_a/articles/national_baseline.htm). Canberra.

Denison, D. (2006). *Directions for the CERC: Highlights of a quantitative use and attitude study with elementary and secondary teachers in nine provinces*. Denison Consultants: Ontario.

Dohn, N. (2007). Knowledge and Skills for PISA – Assessing the Assessment. *Journal of Philosophy of Education*, 41 (1), pp. 1–16.

Dole, S. & Shield, M. (2008). The capacity of two Australian eighth-grade textbooks for promoting proportional reasoning. *Mathematics Education*, Vol. 10, No. 1. Brisbane: The University of Queensland.

Dowling, A. (2008). 'Unhelpfully complex and exceedingly opaque': Australia's school funding system. *Australian Journal of Education*, Vol. 52, No. 2, pp. 129–50.

Epstein, J. (2001). *Book Matters*. W. W. Norton: New York.

Ewing, B. (2004). 'Open your textbooks to page blah, blah, blah': 'So I just blocked off!' in Putt, I., Faragher, R. & McLean, M. (eds) *Proceedings of the 24th Annual Conference of the Mathematics Education Group of Australasia Incorporated: Mathematics education for the third millennium: Towards 2010*. 27–30 June. Townsville, Queensland.

Ewing, B. (2006). 'Go to the page and work it from there': Young people's experiences of learning mathematics from a text. *Australian Senior Mathematics Journal*, Vol. 20, No. 1. Brisbane: The University of Queensland.

Farrell, J. & Heyneman, S. (1989). *Textbooks in the developing world: Economic and educational choices*. Economic Development Institute of the World Bank. World Bank: Washington.

Gaviria, J., Martínez-Arias, R. & Castro, M. (2004). Un Estudio Multinivel Sobre los Factores de Eficacia Escolar en Países en Desarrollo: El Caso de los Recursos en Brasil. A study into school effectiveness factors in developing countries: The case for resources in Brazil. *Education. Policy Analysis Archives*, Vol. 12, No. 20.

Glenn, W., Picus, L. & Odden, A. (2009). The equity of school facilities funding: Examples from Kentucky. *Education Policy Analysis Archives*. Vol.17, No. 14, pp. 1–17.

Grubb, W. N. (2008). Multiple resources, multiple outcomes: Testing the 'improved' school finance with NELS88. *American Educational Research Journal*. Vol. 45, No. 1, pp. 104–44.

Gunstone, R. & Fensham, P. (2004). *Performance of Australian School Students in International Studies in Science*. Schooling Issues Digest 2004/2. DEST. Canberra.

Guthrie, J. & Rothstein, R. (2001). 'Education Finance in the New Millennium', in *A New Millennium and a Likely*

- New Era of Education Finance*, S. Chaikind & W. J. Fowler, Jr. (eds). Larchmont, NY: Eye on Education.
- Häkkinen, I., Kirjavainen, T. & Uusitalo, R. (2003). School Resources and Student Achievement Revisited: New Evidence from Panel Data. *Economics of Education Review*, 22 (3), pp. 329–35.
- Hanushek, E. (2007). Education production functions. *Palgrave Encyclopaedia of Economics*. Palgrave: UK.
- Hanushek, E. (2006). School resources. in Hanushek, E. & Welch, F. (eds) *Handbook of the Economics of Education*. Vol. 2. Elsevier: Amsterdam, pp. 865–908.
- Hanushek, E. (2003). The Failure of Input-based Schooling Policies. *Economic Journal*, 113, pp. 64–98.
- Hattie, J. (2009). *Visible Learning*. Routledge. Oxford.
- Hattie, J. (2003). *Teachers Make a Difference: What is the research evidence?* ACER. October.
- Hautamäki, J. Harjunen, E. Hautamäki, A., Karjalainen, T., Kupiainen, S., Laaksonen, S., Lavonen, J., Pehkonen, E., Rantanen, P., Scheinin, P. with Halinen, I. and Jakku-Sihvonen, R. (2008) *PISA 06 Finland. Analyses, reflections and explanations*. Ministry of Education publications 2008:44.
- Hawley-Miles, K. & Darling-Hammond, L. (1998). Rethinking the Allocation of Teaching Resources: Some Lessons from High Performing Schools. *Educational Policy Analysis*. Spring. Vol. 0. No. 1, pp. 9–29.
- Hollingsworth, H., Lokan, J. & McCrae, B. (2003). *Teaching Mathematics in Australia: Results from the TIMSS 1999 video study*. ACER: Victoria.
- Hopkins, D. (2010). 'Personalised learning in school age education' in E. Baker, B. McGaw & P. Peterson (eds), *International Encyclopedia of Education* (3rd ed.) Amsterdam: Elsevier.
- Horsley, M. (2010). Motivation to learn about teaching and learning materials and their use during teacher education in Australia. *IARTEM e-Journal*, Vol. 3, No. 1, pp. 39–57.
- Horsley, M. (2010). *Australian Publishers Association Survey of Sales of Educational Materials 2000–2008*. Unpublished Paper. Central Queensland University.
- Horsley, M. (2001). 'Emerging institutions and pressing paradoxes' in M. Horsley (ed.), *The future of textbooks? Research about emerging trends*. TREAT: Sydney, pp. 35–52.
- Horsley, M., Knudsen, S. V. and Selander S. & Staffan (eds) (2003). *7th International IARTEM Conference*. Stockholm Library of Curriculum Studies, Vol. 15. Stockholm.
- Horsley, M. & Lambert, D. (2001). 'The secret garden of classroom and textbooks' in M. Horsley (ed.), *The future of textbooks: Research about emerging trends*. TREAT: Sydney, (pp. 8–24).
- Horsley, M. & Laws, K. (1993). Textbooks aren't terrible. Textbook use in the classroom: The gap between theory and practice. *Australian Teacher Education Association Conference*, July, Perth.
- Horsley, M. & Laws, K. (1993). Textbooks in the practicum. *Fifth National Practicum Conference*, June. Macquarie University, Australia.
- Horsley, M. & Walker, R. (2006). 'Video based classroom observation systems for examining the use and role of textbooks and teaching materials in learning' in Bruillard, E., Aamotsbakken, B., Knudsen, S. & Horsley, M. (eds) *Caught in the web or lost in the textbook?* STEF, IARTEM, IUFR de Basse-Normandie, Paris: Jouve. International Conference on Learning and Educational Media.
- Horsley, M. & Walker, R. (2003). Textbook pedagogy: A sociocultural approach. Invited keynote address to the biennial conference of the *International Association for Research on Textbooks and Educational Media*. Bratislava. 24–27 September.
- Horsley, M. & Walker, R. (2008). 'Best Practice in Designing and Managing Homework support: a sociocultural interpretation of homework and affording learning through homework practice' in McInerney, D., Dowson, M. & Van Etten, S. (eds) *Effective Schools, Volume 8, in Research on Sociocultural Influences on Motivation and Learning, Information Age Publishing*.
- Horsley, M. & McCall, J. (eds) (2009). *Peace, Democratisation and Reconciliation in Textbooks and Educational Media*. Ninth International Conference on Learning and Educational Media (International Association for Research on Textbooks and Educational Media). Tonsberg. Norway: Hogskolen Vestfold. IARTEM.
- Jamieson-Proctor, R. & Byrne, C. (2008). 'Primary teachers' beliefs about the use of mathematics textbooks' in 31st Annual Conference of the Mathematics Education Research Group of Australasia (MERGA31), 28 June–1 July 2008, Brisbane, Australia.

- Japanese Textbook Research Center (1996) *Outline of the Japanese Textbook Research Center*. Tokyo.
- Japanese Textbook Research Centre (1998). *Outline of the current textbook system in Japan*. Tokyo.
- Jensen, B. (2010). What teachers want: *Better teacher management*. Grattan Institute Report No. 2010, 3 May 2010.
- Kress, G. & Van Leeuwen, T. (2006). *Reading Images: The grammar of visual design*. Hodder: UK.
- King, R. Swanson, A. & Sweetland, S. (2005). Designing finance structures to satisfy equity and adequacy goals. *Education Policy Analysis Archive*. Vol. 13, No. 15, pp. 1–26.
- Kaur, B. Kiam, L. & Hoon, S. (2006). 'Mathematics, teaching in two Singapore classrooms: The role of the textbook and homebook' in Clarke, D. Keitel, C. & Shimizu, Y. (eds) *Mathematics Classrooms in Twelve Countries: The Insider's Perspective*. Sense Publishers: Rotterdam.
- Kennedy, M. (2010). Attribution error and the quest for teacher quality. *Educational Researcher*. Vol. 39. No. 8, pp. 591–98.
- Kupari, P. (2007). PISA kertomaa (Told by PISA). In: KASVATUS. 4/2007. *The Finnish Journal of Education*. Jyväskylä: Jyväskylän yliopisto.
- Kupiainen, S. & Pehkonen, E. (2008) PISA 2006 – Mathematical Literacy Assessment. In Hautamäki & al. PISA 06 Finland. Analyses, reflections and explanations. Ministry of Education publications 2008:44.
- Ladd, H., Chalk, R. & Hansen, J. (1994). *Equity and Adequacy in Education Finance*. National Research Council (U.S.) Committee on Education Finance, Washington.
- Lambert, D. (1999). Exploring the use of textbooks in KS3 geography classrooms: A small scale study. *The Curriculum Journal*, 10, pp. 85–105.
- Lambert, D. (2000). 'Textbooks and the teaching of geography' in C. Fisher and T. Binns (eds), *Issues in Geography Education*. London: Routledge, pp. 108–19.
- Lavonen, J. (2008). 'PISA 2006 – Science Literacy Assessment' in Hautamäki et al. (2008) *PISA 06 Finland. Analyses, reflections and explanations*. Ministry of Education publications 2008:44.
- Lavonen, J. & Laaksonen, S. (2009). Context of Teaching and Learning School Science in Finland: Reflections on PISA 2006 Results. *Journal of Research in Science Education*. pp. 922–944.
- Laws, K. & Horsley, M. (1992). Educational Equity: Textbooks in New South Wales Government and non-Government Secondary Schools. *Curriculum Perspectives*. Vol. 12, No. 3, pp. 7–17.
- Lee, M. & Gaffney, M. (2008). *Leading a digital school: Principles and practice*. ACER Press: Victoria.
- Leigh, A. & Ryan, C. (2010). Long run trends in school productivity: Evidence from Australia. Forthcoming. *Education, Finance and Policy*.
- Loewenberg-Ball, D. & Feiman-Nemser, S. (2005). 'Using Textbooks and Teachers' Guides: What beginning elementary teachers learn and what they need to know' in Denicols, Pam., L. Kompf, Michael (eds), *Teacher Thinking and Professional Action*. Routledge: Oxford, pp. 189–200.
- Loewenberg-Ball, D. & Cohen, D. (1996). Reform by the Book; What Is?: Or Might be: The role of curriculum materials in teacher learning and instructional reform. *Educational Researcher*, Vol. 25 No. 9, pp. 6–14.
- Market Data Retrieval. (2009). *Enrolment Comparison Report 2008–2009*. MDR: Connecticut.
- Masters, G., Rowley, G., Ainley, J. & Kheo, S. (2008). *Reporting and Comparing School Performances*. Paper prepared for MCEETYA Expert Working Group. DEEWR: Canberra.
- MCEETYA (2006). *Learning for an online world: Leadership Strategy*. Commonwealth Government of Australia. Canberra.
- McGaw, B. (2009). The place of reading in the Australian national curriculum. *Effective Reading for All: National and International Perspectives*. Learning Difficulties Australia: Melbourne.
- McMorrow, J. (2008). *Reviewing the evidence: Issues in Commonwealth Funding of Government and non-Government schools in the Howard and Rudd years*. Australian Education Union. Victoria.
- Means, B., Toyama, Y., Murphy, R., Bakia, M. & Jones, K. (2009). *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies*. U.S. Department of Education, Office of Planning, Evaluation, and Policy Development, Policy and Program Studies Service. Center for Technology in Learning.

- Miller, J. (2009). Teaching refugee learners with interrupted education in science: Vocabulary, literacy and pedagogy. *International Journal of Science Education*, Vol. 31, No. 4, pp. 571–92.
- Muspratt, A. (2006). *Representing scientific knowledge in high school textbooks: A corpus study*. Brisbane: Griffith University.
- Nettle, K. (2001). 'International Aspects of Expenditure on Schoolbooks' in the *Future of Textbooks: International Colloquium on school publishing: Research about emerging trends*. Horsley, M. (ed.). TREAT: University of Sydney.
- New South Wales Ministry of Education. (2000). Quality matters revitalising teaching: Critical times, critical choices. *Review of Teacher Education*. New South Wales Department of Education and Training.
- Ninnes, P. (2000). Representations of indigenous knowledge in secondary school science textbooks in Australia and Canada. *International Journal of Science Education*, Vol. 22, No. 6, pp. 603–17
- Nishino, R. (2008). Political economy of the textbook in Japan, with particular focus on middle-school history textbooks, ca. 1945–1995. *Internationale Schulbuchforschung (International Textbook Research)*. Vol. 30, No. 1, pp. 487–514.
- Nolan, S., Ward, C., Horn, I., Campbell, S., Mahna, K. & Childers, S. (2007). Motivation to Learn During Student Teaching. *American Education Research Society*, Chicago, April.
- O'Brien, D. (2009) *Submissions to the Productivity Commission Inquiry Into: Restrictions on the Parallel Importation of Books*. Cengage Learning. January and April: Canberra.
- OECD (2010) PISA 2009 Results: What makes a school successful? *Resources, Policies and Practices*. Volume IV. OECD. Paris.
- OECD (2009). Creating effective teaching and learning environments: First results from TALIS (*Teaching and Learning International Survey*). OECD Publishing.
- OECD (2008). *Innovating to Learn, Learning to Innovate*. Organisation for Economic Cooperation and Development. OECD Publishing.
- OECD. (2007a). *OECD's PISA survey shows some countries making significant gains in learning outcomes* (www.oecd.org/document/22/0,3343,en_2649_34487_39713238_1_1_1_1,00.html).
- OECD. (2007b). *PISA 2006 results*. (www.pisa.oecd.org/document/2/0,3343,en_32252351_32236191_39718850_1_1_1_1,00.html).
- OECD (2004). *OECD Education at a Glance*. 2004. Paris.
- OECD (2004). *The OECD Handbook for Internationally Comparative Education Statistics 2004*. Paris.
- Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Education and Vocational Training (2007). *Top of the Class: Report on the Inquiry into Teacher Education*, House of Representatives Publishing Unit, Canberra.
- Parliament of Victoria, Education and Training Committee (2005). *Step Up, Step In, Step Out: Report on the Inquiry into the Suitability of Pre-Service Teacher Training in Victoria*, final report, No.115 session 2003–2005, Parliament of Victoria, Melbourne.
- Peacock, A., & Cleghorn, A. (eds) (2004). *Missing the meaning: The development and use of print and non-print materials in diverse school settings*. New York: Palgrave.
- Pegrum, M. (2009). *From blogs to bombs: The future of digital technologies in education*. UWA Publishing: Western Australia.
- Pont, B., Nusche, D. & Moorman, H. (2008). *Improving School Leadership. Volume 1: Policy and Practice*. Directorate for Education, OECD: Paris.
- Pont, B., Nusche, D. & Hopkins, D. (2008). *Improving School Leadership. Volume 2: Case Studies on System Leadership*. Directorate for Education, OECD: Paris.
- Richardson, S. & Horsley, M. (2011). Teachers' Use of Teaching and Learning Materials in Homework Practices in Australian Primary Schools. *11th International Conference*. International Association for Research on Textbooks and Educational Media. Kaunas: Lithuania.
- Rollans, G. & de la Chenelière, M. (2010). *Study of the Canadian K to 12 educational book publishing sector*. Canadian Heritage (Department of Canadian Heritage).

Rodriquez, J., Horsley, M. & Knudsen, S. (eds) (2010). *Local, National and Transnational Identities in Textbooks and Educational Media*. Tenth International Conference on Learning and Educational Media (International Association for Research on Textbooks and Educational Media). Santiago De Compostela: University of Santiago. IARTEM: Norway.

Rorris, A. (2008). *Rebuilding Public Schools: 2020 Investment*. Australian Education Union: Victoria.

Rowe, K. (2003). *The Importance of Teacher Quality*. New South Wales Institute of Teachers.

Schleicher, A. (2010) *Evaluating Systems to Improve Education*, PISA, 2009. OECD: Paris.

Selander, S. (2009). 'Designs of democracy in contemporary learning resources' in Horsley, M. & McCall, J. (eds). *Peace, Democratisation and Reconciliation in Textbooks and Educational media*. Ninth IARTEM Conference on Textbooks and education media: Hogskolen Vestfold. Norway.

Selander, S. (2008). Designs for learning: a theoretical perspective. *Designs for Learning*, Vol. 1 (1), pp.10–22. Stockholm University.

Selander, S. & van Leeuwen, T. (1999). 'Vad gör en text?' (What does a text do?) in Säfström, C. & Östman, L. (eds). *Textanalys*. Lund: Studentlitteratur. Sweden.

Shield, M. & Dole, S. (2009). 'An analysis of middle years school mathematics textbooks' in Hock, C., Wahyudi & Devadason, R., et al. (eds) *Proceedings CoSMEd 2009*. The International Conference on Science and Mathematics Education (CoSMEd 2009), Penang, Malaysia, 10–12 November 2009.

Shield M. & Dole, S. (2002). 'Investigating textbook presentations of ratio and proportion' in Barton, B., Irwin, K., Pfannkuch, M. & Thomas, M. (eds) *Proceedings Mathematics in the South Pacific*. The 25th Annual Conference of the Mathematics Education Research Group of Australasia. University of Auckland.

Shulman, L. (1986). Those Who Understand Knowledge Growth in Teaching. *Educational Researcher*. Vol. 15, No. 2, pp. 4–14.

Skarin, T. (2008). *Effective use of ICT in schools: An analysis of international research*. Swedish National Agency for School Improvement.

Somekh, B. Mavers, D. & Lewin, C. (2003). Using ICT to enhance home-school links: An evaluation of current practice in England. *ICT in Schools Research and Evaluation Series No. 4*. British Educational Communications and Technology Agency (BECTA), UK.

Stacey, K. & Vincent, J. (2009). Modes of reasoning in explanations in Australian eighth-grade mathematics textbooks. *Educational Studies in Mathematics*, Vol. 72, pp. 271–88. New York: Springer.

Thomson, S. & De Bortoli, L. (2008). *Exploring Scientific Literacy: How Australia measures up. The PISA 2006 survey of students' scientific, reading and mathematical literacy skills*. ACER. Melbourne.

Tipper, A. (2008). *Digital publishing & online retailing: How is the 'digital revolution' affecting the evolution of the Australian book industry*. Unwin Trust.

Tufte, E. (2003). *The Cognitive Style of PowerPoint*. Cheshire, CT: Graphics Press.

Tuovinen, J. (2008). 'Learning the Craft of Teaching and Learning from World's best Practice' in D. McInerney & A. Liem (eds) *Teaching and Learning: International Best Practice*. Vol. 8. in *Research on sociocultural influences on motivation and learning*. Information Age Publishing. New York.

Uljens, M. *PISA-resultaten i Finland. Perspektiv på och förklaringar till framgången. The PISA-results in Finland*. Perspectives on and explanations to the results (www.vasa.abo.fi/pf/pispi/pi/personWebb/Michael/pdf/PISA.pdf), date retrieved 7 November 2008.

Unsworth, L. (2004). Comparing school science explanations in books and computer-based formats: the role of images, image/text relations and hyperlinks. *International Journal of Instructional Media*, Vol. 31, No. 3, p. 283.

Välljärvi, J. (2007). 'Suomalainen koulu oppimisen ympäristönä' (The Finnish School as a learning environment.) in KASVATUS *The Finnish Journal for Education*. Jyväskylä: Jyväskylän yliopisto. Vol. 4.

Valsiner, J. (1987). *Culture and the development of children's action*. Chichester, UK: John Wiley & Sons.

Vincent, J. & Stacey, K. (2008). Do mathematics textbooks cultivate shallow teaching? Applying the TIMSS video study criteria to Australian eighth-grade mathematics. *Mathematics Education Research Journal*, Vol. 20, No. 1, pp. 82–107. Melbourne: University of Melbourne.

Vinson (2002). *The New South Wales Public Education Inquiry*. New South Wales Teachers' Federation. Sydney.

- Vygotsky, L.S. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.
- Wall, J. & Ryan, S. (2010). *Resourcing for curriculum innovation*. ACER Press: Victoria.
- Walker, R. & Horsley, M. (2006). 'Textbook Pedagogy: A sociocultural analysis of effective teaching' in McNerney, D., Dowson, M. & Van Etten, S. (eds) *Effective Schools. Research on Sociocultural Influences on Motivation and Learning*, Vol. 6, Information Age Publishing; Greenwich, pp. 105–133.
- Watson, R. (2000). *Relation between school book spending and school results*. Report for the UK Publishers' Association. London.
- Woessmann, L. (2005). Educational production in Europe. *Economic Policy* 20, No. 43, pp. 446–504.
- Young, C. & Horsley, M. (1995). The Shock of the New. *EQ Australia, Curriculum Corporation*, Issue 3, Spring: Melbourne.
- Zikorova, Zuzana. (2005). 'Transforming curriculum as teachers' activity' in Mike Horsley, Suzanne Knudsen, Stefan Selander (eds) *'Has Past Passed?' Textbooks and Educational Media for the 21st Century*. Stockholm Institute of Education Press, Štátny pedagogický ústav, Stockholm, Bratislava.
- Zikorová, Zuzana. (2004). *Výběr učebnic na základních a středních školách*. (Textbook selection in primary and secondary schools). Ostravská univerzita – Pedagogická fakulta, Ostrava.
- Zikorova, Zuzana. (2007). 'Textbook-based activities in the classroom' in Mike Horsley, James McCall (eds.) *Ninth International Conference on textbooks and Educational Media: Peace, Democratization and Reconciliation in Textbooks and Educational Media*. IARTEM, Tonsberg, pp. 159–65.
- Zikorova, Zuzana & Cervenková, Iva. (2011). 'Textbook Use in the History, Civics, English and Mathematics Lessons of Czech Lower Secondary Schools' in Jesus Rodríguez, Mike Horsley, Susanne Knudsen (eds) *Local, National, and Transnational Identities in Textbooks and Educational Media*. IARTEM, Santiago De Compostella , pp. 550–56.
- Zikorová, Zuzana & Červenková, Iva. (2007). *Užívání učebnic a jiných textových materiálů ve výuce na ZŠ a gymnáziu* (The use of textbooks and other text materials in secondary schools), In *XV. konference ČAPV*. (Proceedings of XV. Conference of Czech Association of Educational Research), Pedagogická fakulta JU, České Budějovice.