

BOLD VISIONS IN EDUCATIONAL RESEARCH

The Future of Educational Research

**Perspectives from beginning
researchers**

Noleine Fitzallen, Robyn Reaburn and
Si Fan (Eds.)

SensePublishers

The Future of Educational Research

Bold Visions in Educational Research

Volume 37

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The Future of Educational Research

Perspectives from Beginning Researchers

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PREFACE

The Future of Educational Research: Perspectives from Beginning Researchers showcases the work of higher degree by research (HDR) students from the Faculty of Education at the University of Tasmania. It aims to provide an avenue for the students to contribute to research literature early on in their career and supports the notion of publication throughout one's study. The book provides a snapshot of the current state of research across a broad range of fields in education. Each chapter makes a genuine contribution to knowledge in the relevant area and so the book will be useful to a broad range of education researchers. For supervisors and HDR students the book is useful as a set of examples of student writing, suggesting to supervisors and their students the sorts of writing that research higher degree students in education can undertake and the contribution they can make as they progress their candidature.

Contributions to this book cover the spectrum of education from the early years through to tertiary education. In terms of researching teachers, they cover topics as diverse as teachers' time allocation, how teachers manage the introduction of new technology, how the creative endeavour can be affected by the process of teaching and how teachers manage the introduction of new curricula. In relation to students, they cover topics such as mathematics anxiety, the effect of membership of garage bands, and the effects of the transition from primary to secondary school on literacy. From a parents' point of view there is a contribution about the effects of an early learning intervention. There are also chapters on diverse topics such as techniques to assist learning for children with autism, why males find it difficult to become primary teachers, and the role of philanthropy in university funding.

Apparent in the chapters is that research in education can involve a wide variety of methods of data collection and analysis. Some writers have used questionnaires, others interviews, and others a mixture of both. Some have used their own classroom experiences, classroom observations or students' work samples. Yet another has used narrative research. There is also a diverse range of quantitative and qualitative analyses. Evident in all the chapters is the passion the researchers have for their area of interest and their desire to contribute to a better understanding of educational practices and issues.

All but one of the beginning researchers in this book presented aspects of their research at a Post Graduate Research Conference hosted by the Faculty of Education at the University of Tasmania. Following the conference the students used the feedback received at their presentations to expand upon their initial ideas and write the chapters presented in this book. In some cases the students collaborated with their supervisors to write the chapters. All the beginning researcher chapters in the book are first-authored by an HDR student. The introductory chapters for each of the sections in the book are authored by established, and in some cases eminent,

PREFACE

researchers in the relevant fields from the University of Tasmania, with an interest in Education.

The chapters in the book underwent a double blind peer-review process. First the students' chapters were reviewed by the researchers responsible for writing the introductory chapter for the section within which the individual chapters were positioned. Feedback was incorporated into the chapters before undergoing an external peer review process. The external reviews were conducted by established researchers in the relevant fields, in most cases external to the University of Tasmania. A list of external reviewers is provided after the chapters.

STRUCTURE OF THE BOOK

The book is divided into five sections each of which is introduced by a chapter written by an established researcher/s in the field. The sections are: Researching Policy and Curriculum, Researching Teachers' Experience, Researching Educational Technologies, Researching the Teaching and Learning of Mathematics, and Researching Literacy Development.

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To publish requires a publisher who can be convinced to support the underlying proposal and conceptualisation of the book. We acknowledge Sense Publishers for their support to publish this book, and assistance in managing the publishing process. In particular, the advice and communications of Michel Lokhorst assisted in bringing the book to publication.

We acknowledge the support from the Faculty of Education, the Centre for Pathways and Partnerships, The Institute of Learning and Teaching, and colleagues at the University of Tasmania, who provided support throughout the process of compiling the book. Especially, we thank Associate Professor Kim Beswick who got us started on this endeavour and Nick Walkem who provided invaluable administrative support and facilitated the external review process.

We thank Abbey McDonald for allowing us to use her painting on the cover of this book. Abbey is one of the chapter authors and we are excited that this book provides her with the opportunity to showcase her work as an artist as well as a researcher. The image is representative of all the beginning researchers who contributed to this book. In the same way that the bird takes flight, through the publication of this book, the students take flight as researchers.

We express our sincere appreciation to the beginning researchers who so willingly shared their research stories. Finally, we acknowledge the supervisors who supported their students in the writing process by either contributing as co-authors or by providing feedback on early versions of the chapters.

The Editors
Noleine Fitzallen, Robyn Reaburn, and Si Fan.

SECTION 1

RESEARCHING POLICY AND CURRICULUM

NATALIE BROWN & KIM BESWICK

POLICY AND CURRICULUM RESEARCH IN THE CONTEXT OF CHANGE

There is continual change in the education landscape in response to both public and political agendas. In the early 1990s, Simon Marginson noted that “the politics of education are changing and volatile, with little consensus on some issues” (1993, p. 3). This remains the case, with education policy highly politicised, and the results of this playing out in inevitable cycles for state-funded education systems, and other education stakeholders. In Australia, the past 20 years have seen major changes in curriculum for the compulsory years of schooling. These have encompassed development of outcomes based curricula (Donnelly, 2007), Essential Learnings curricula (Luke, Matters, Herschell, Grace, Barratt, & Land, 2000; Department of Education, Tasmania, 2002; Townsend & Bates, 2007), and a recent return to national curriculum prescribed for disciplinary areas (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2012a). This latest curriculum development is part of a broader move to a national policy environment that, in addition to a national curriculum, features a national assessment program in literacy and numeracy (NAPLAN), national standards for teachers (Australian Institute for Teaching and School Leadership [AITSL], 2011a), and national accreditation of teacher education programs (AITSL, 2011b). There has also been increasing attention given to the early years of schooling, including pre-school provision (Press, 2008). In the tertiary sector, a move to demand driven university places, and an emphasis on social inclusion reflected through a changed funding model, has had implications for university entrance and pathways into and out of tertiary study (Bradley, Noonan, Nugent & Scales, 2008; Commonwealth of Australia, 2009). Public universities are increasingly seeking alternative sources of revenue to supplement and enhance state-based funding (Johnstone, 2004; Chung-Hoon, Hite, & Hite, 2005). In addition, university rankings have assumed increased importance in the context of a global market in higher education (Marginson & Van der Wende, 2007).

Changes of this kind are global phenomena. International trends towards refreshing curriculum and pedagogy have been motivated by the perceived changing needs of society in the 21st century (Le Métias, 2003; Luke, Freebody, Shun, & Gopinathan, 2005; Watson, Beswick, & Brown, 2012). This has included the development of values-based curricula in countries such as New Zealand, South Africa, United States (Rodwell, 2011), Portugal (Carvalho, & Solomon, 2012) as well as a focus

on pedagogical reform based on research findings in specific disciplinary areas (e.g., De Jong, 2004; Carvalho & Solomon, 2012). Educational change can be prompted by numerous factors. At least in Australia, significant educational change, including curriculum change has resulted from changes of government (Baker, Trotter, & Holt, 2003). There has also been change as a result of public, or media scrutiny. An excellent example of this has been documented in Tasmania by Mulford and Edmunds (2010) who analysed 141 articles concerning a curriculum reform in a daily newspaper – stemming from initial support to a decidedly negative stance in concert with the demise of the initiative. Support for change is often provided through presentation of data, however, the sources and validity of these data as a rationale for the changes proposed may be open to question or critique. This is particularly the case where narrow sources of data are used to drive reform.

Perhaps the best illustration of this is the current debate about the use of standardised testing to drive reform – particularly in curriculum and pedagogy. Assessment for raising standards of education has,

Become a globalized educational policy discourse; the evaluation message system (manifest as high-stakes national census testing) has taken the upper hand in many schooling systems around the world with England as the best (or worst?) case in point. (Lingard, 2010, p. 131)

As Stobart (2008) notes,

A key purpose of assessment, particularly in education, has been to establish and raise standards of learning. This is now a virtually universal belief – it is hard to find a country that is not using the rhetoric of needing assessment to raise standards in response to the challenges of globalisation. (p. 24)

The results of the most recent Trends in International Mathematics and Science Study (TIMSS) and the Progress in International Reading Literacy Study (PIRLS) that show declines in Australia's standing (Thomson, Hillman, Wernert, Schmid, Buckley & Munene, 2012) will almost certainly provoke further calls for change.

The accountability agenda that accompanies increasing emphasis on standardised testing is consistent with a global trend, particularly through the UK and US. In the US, accountability and testing reforms have been broadly criticised (Hursh, 2008; Darling-Hammond, 2010). In Australia increased accountability is focussed on teacher education and the teaching profession, as evidenced by the AITSL developments alluded to above, as well as the school sector. In regard to the latter, the 'My School' website has been introduced giving ready access to statistical information of all Australian schools. Among the key pieces of information available through this site are NAPLAN results. Supporters of NAPLAN testing, point to the ready availability of time series data to assist with diagnosis of learning outcomes and ability to monitor progress. From the *Using My School to support school and student improvement* fact sheet (ACARA, 2012b),

Effective schools collect quality information from student assessment to evaluate themselves and examine where they need to improve and how they can use experiences of success and failure to generate that improvement.

Allan Luke is a vocal critic of such narrowly focussed high stakes testing, contending that using this as a measure of educational outcome can fail students from low socio-economic or culturally and linguistically diverse backgrounds (2010). He suggests that this type of testing can lead to “scripted standardized pedagogy” that results in “an enacted curriculum of basic skills, rule recognition and compliance” (p. 180). A critique of the NAPLAN tests for a specific group, Indigenous children from remote communities, has been written by Wigglesworth, Simpson and Loakes (2011). They call into question, through the use of specific examples, the use of this as a diagnostic tool for second language learners and children from remote communities. This is through not only the specific language used, but also the assumed cultural knowledge. A further concern with the current popularity of outcome measures is that there is a danger of “measuring what is easy to measure, rather than what is significant in terms of public sector organisations such as schooling systems” (Lingard, 2010, p. 135).

David Berliner and colleagues have researched and documented similar concerns about high stakes testing and their detrimental and unintended outcomes for disadvantaged student groups in the US for some time, as well as negative impacts on curriculum and teaching (e.g., Amrein & Berliner, 2002; Nichols & Berliner, 2005; 2008). Lessons to be learned from the US experience, however, appear not to have been heeded elsewhere. Rather the Australian trend towards standardised testing can be seen as part of a global movement towards ‘policy borrowing’ (Steiner-Khamsi, 2004). Adopting policy and practice that is being used elsewhere can be seen as avoiding reinvention of the wheel, particularly when the policy in question has been based on quality and relevant research and the limits of transferability arising from contextual differences have been well understood. The practice, however, needs to be regarded with caution. Lingard (2010) notes that,

To be effective, policy borrowing must be accompanied by policy learning, which takes account of research on the effects of the policy that will be borrowed in the source system, learning from that and then applying that knowledge to the borrowing system through careful consideration of national and local histories, cultures and so on. (p. 132)

In the context of global policy borrowing, educational researchers need to be vigilant and active.

We contend that for change to bring about positive outcomes for students, it needs not only to be based on quality research but also that evidence is drawn from multiple sources. Importantly, there is a need for cognisance of context. As well as providing a rigorous research basis for future policy, educational researchers have

an important role to play in evaluating strategic change and initiatives that spring from policy changes or innovation. Because education is of public interest, ensuring that initiatives, especially those that have input of resources, receive ongoing and rigorous evaluation is necessary not only for accountability, but to enhance the quality of the education and the educational outcomes of students. Researchers also have a responsibility to publish their findings in a timely fashion and in ways that maximise access to them by policy makers and stakeholders.

THE CHAPTERS

The chapters in this section represent research that has sprung from new initiatives, or systemic change. The projects presented are diverse but reflect a global acceptance of the concept of lifelong learning and informal learning (Morgan-Klein & Osborne, 2007). They cover the full spectrum of formal learning – early childhood and care and ‘prior to’ learning programs (Nailon & Beswick, and Giacon & Hay) through to Higher Education (Mohd Isa & Williamson). Both in-school curriculum (Moran, Budd, Allen, & Williamson) and extra-curricular learning (Baker) are also given attention. Two of the studies reported allowed sometimes neglected voices in educational research to be heard: parents in the case of Giacon and Hay’s work, and adolescent boys in Baker’s study.

The chapters are also diverse in research methodology and underscore the varieties of methodologies that can and, we argue, should be used to drive and evaluate changes in educational policy and practice. The need to embrace broad research perspectives and diverse methodologies to predict the need for, evaluate success of, and suggest new directions for educational policy has been picked up by a number of researchers. For example, Luke et al. (2005) critiqued: “An overreliance on test and examination scores as a principal indicator of system efficacy and classical experimental design models as the sole model for the selection and implementation of [educational] reform” (p. 12). They proposed that,

An alternative is to build a rich, multidisciplinary and interpretive social science as the evidence base; and to disseminate the findings of a range of studies broadly across the educational community to prompt debate and discussion, and to focus innovation. (p. 12)

In his work on educational leadership and education outcomes, Mulford (2007) also commented on research methodologies. He pointed out that both qualitative and quantitative methodologies can result in significant data reduction – and in the analysis phase that researchers must ensure that evidence presented for, in this case linking leadership to student outcomes, is sufficiently complex “to come close to the reality faced by schools” (p. 20) and therefore to assist in both understanding and predicting “appropriate outcomes and practice” (p. 22). Multiple methodologies allow issues to be understood at differing but equally important levels of analysis from systemic to individual with studies focussed on particular cases or contexts

providing insights into broad phenomena. Case studies are commonly employed in education research (Tight, 2003). When well-constructed, well defined and acknowledging of limitations, they can offer broad applicability through both the methodology employed and the findings. This is particularly true when the researchers critically confirm or challenge previous findings from the literature, with respect to the context of the specific case. Four of the five studies presented in this section have utilised a case study approach with cases ranging from individuals involved in a garage band (Baker) to two universities located in different countries (Mohd Isa & Williamson).

Using a narrative inquiry, Baker has explored the music, musical practices, well-being and identity of young musicians who are members of garage bands. The findings of this study have much to offer teachers working with young people. There is also a broader message here for education policy makers whose decisions impact young people such as those in Baker's study: research that gives voice to young people, allowing them to explain the world from their own perspective, is crucial to the effectiveness of initiatives designed to improve their attainment and opportunities.

The critical role of the early years in creating conditions for successful education has been well documented around the world (Attanasio, 2012; National Scientific Council on the Developing Child, 2008; Shonkoff & Phillips, 2000). This perspective underpinned Giacon and Hay's study investigating a specific initiative of the Tasmanian Government, the *Launching into Learning (LiL)* program. The chapter by Nailon and Beswick describes the broader policy context in which studies such as Giacon and Hay's are situated. They present an overview of policy changes in early childhood education and care (ECEC) in Australia from the beginning of the 21st Century. Nailon and Beswick consider the key national influences on the development of policy in the suite of formal (non-parental) programs for education and care of children prior to formal school entry. The use of a methodology where historical policy developments have been summarised and reviewed, with reference to research and evaluation of policy developments has allowed them to highlight the complexity of the ECEC sector. Moran, Budd, Allen and Williamson are working in a school-based setting, to explore professional learning needs of teachers implementing *The Australian Curriculum: English* (ACARA, 2012c), and using multiple sources of data to build a deep understanding of their research questions. The prevalence of major curriculum reform has been alluded to in the introduction to this chapter. The consequent professional learning needs of teachers are therefore an important research focus. Moran et al. are analysing the new Australian curriculum in secondary English (ACARA, 2012c) in a number of interesting ways.

One interesting element of Moran et al.'s work is the underpinning theoretical model that is being used to inform the study. The researchers have adopted Harris and Marsh's Authority model (Harris & Marsh, 2005), to reflect the way in which the curriculum change is being implemented in schools. This model, viewing change as an authoritative top-down process, is guiding the choice of methodological

approaches. The chapter by Mohd Isa and Williamson offers a different perspective on implications of educational policy. They have used a qualitative survey as their main data instrument. The choice of this methodology is consistent with the research being conducted in two different and culturally diverse countries: Malaysia and Australia. The issue that is the subject of the research, philanthropy, has been the subject of some previous studies conducted in Australian higher education institutions, but Mohd Isa and Williamson have broadened the lens to look at two contexts through two qualitative case studies that entailed collecting evidence through documentary analysis, surveys and interviews in the two purposively selected universities. Their work highlights the general importance of attending to context as well as identifying specific contextual differences that impact on philanthropic fund raising by universities in Malaysia and Australia. It exemplifies how a one size fits all approach is often not appropriate, and localised research can be essential for quality outcomes.

CONCLUSION

We began this chapter by acknowledging that change is a constant part of the context in which educational research is conducted and education policy is enacted. The researchers whose work is presented in the chapters of this section are working and will continue to work in a politicised environment whether in Australia or elsewhere. This is at least in part due to the importance of education to individuals in terms of their life outcomes and opportunities, and to governments for which education represents both a major expenditure and the means of improving economic and social outcomes at a national level (Considine, Marginson, Sheehan, & Kumnick, 2001; Wyn, 2006)).

The research studies in this section are diverse in scope, subject and methodology but together illustrate some key features of the kind of research that is needed to inform policy and curriculum debates into the future. These are:

- the value in attending to the voices of education stakeholders that can easily be neglected in a focus on student outcomes and teacher competence (Baker and Giacon & Hay);
- the importance to attending to differences between contexts and the need to adapt policy settings and expectations accordingly (Mohd Isa & Williamson);
- the need to consider and adequately provide for the implications of change for those charged with its implementation (Moran et al.); and
- the importance of understanding the historical context in which current developments are occurring with a view to learning from that (Nailon & Beswick).

We encourage these and other educational researchers to remain vigilant and active in: their examination and critique of educational policy, their contributions to the research base that will inform developments into the future, and the communication of their findings to the broad education community including policy makers.

POLICY AND CURRICULUM RESEARCH IN THE CONTEXT OF CHANGE

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CHANGES IN POLICY RELATED TO EARLY CHILDHOOD EDUCATION AND CARE IN AUSTRALIA: THE JOURNEY TOWARDS PEDAGOGICAL LEADERSHIP

This chapter provides an overview and commentary on two decades of policy changes in early childhood education and care (ECEC) in Australia that led to a National Quality Framework (NQF) for ECEC services for children from birth to five years (Council of Australian Governments [COAG], 2009a). It can be argued that the direction of the policy changes has meant that educators in these services have been increasingly asked to adopt pedagogical leadership skills and practices. Highlighting the recent shifts and influences on ECEC policy in Australia provides a context for future research into the development of pedagogical leadership by educators working in ECEC services. For the purposes of this chapter ECEC relates to formal, non-parental, education and care arrangements available to children before they commence formal schooling. While the nomenclature may be different in the various States and Territories the term ECEC broadly includes services such as long day care (centre based and home-based), and pre-school (Brennan, 2008), offered in a range of locations.

The provision of education and care for young children in Australia is big business for governments and providers. A 5 year snapshot to 2009 outlined in a Report by the Office of Early Childhood Education and Child Care (OECECC) “State of Child Care in Australia” highlighted the growth of investment, accessibility and utilisation rates in the sector (Department of Education, Employment and Workplace Relations [DEEWR], 2010b). The OECECC Report, based on administrative and survey data from DEEWR, the Productivity Commission and the Australian Bureau of Statistics (ABS), noted that early childhood education and care funding had more than doubled during those years, up from \$1.7b in 2004/5 to \$3.7b in 2008/9 (DEEWR, 2010b). Much of this funding was used to offset service fees for eligible families. By the September quarter of 2009 around 500,000 children from birth to 5 years were in approved care across Australia with families paying on average \$60.80 per day and \$287.00 per week for long day care (DEEWR, 2010b). The magnitude of the overall investment by individual families and governments keeps ECEC service provision high on the nation’s economic, social and political agendas. Some might say that recent policy changes which have resulted in a coherent national approach to funding and service provision could have been forecast on economic

grounds alone. There is, however, more to the story of the direction of ECEC policy changes that have occurred in recent times. While the changes have responded to the need for accountability in government spending, they have also been informed by policy outcomes from previous decades and from research that has centred on young children's development and learning. It is these influences that have impacted most on educators' practice as pedagogical leaders. The remainder of this chapter describes policy influences and changes in Australia leading up to the introduction of the NQF, and the resultant press for educators to see themselves as pedagogical leaders who adopt an active role in promoting their practice "especially those aspects that involve building and nurturing relationships, curriculum decision-making, teaching and learning" (DEEWR, 2010a, p. 6).

ECEC POLICY IN AUSTRALIA: LANDMARKS OF CHANGE

All three levels of government in Australia, federal, state/territory and local, have been involved in the provision of ECEC services for almost half a century - providing funding and regulating sites and practice. Over time, administrative responsibilities of each of the levels of government have been re-arranged, or changed, as policies were developed and agreements reached. Periods of policy change and influence on these changes have been highlighted elsewhere using lenses such as 'the rise of quality' (Logan, Press & Sumsion, 2012, p. 4), or 'the mixed economy of child care' (Brennan, 2007, p. 214). Our tracing of ECEC policy agendas that, in part, led to a focus on pedagogical leadership reflects intentions similar to those outlined in Logan et al., and McLachlan (2011) who noted the importance of reflecting on history to address current concerns. Such reflection also provides a necessary basis for future research in the area.

Policies for Parent Workforce Participation

Throughout the 1970s and 1980s, the Australian federal and state governments developed parallel ECEC systems and responsibilities (MacDonald, 2002). During that time operational grants were provided by the Federal Government to child care centres to cover staffing costs according to prescribed formulas, and linked funding to priority of access to children of working parents. The decision by the conservative Liberal/National Coalition in 1996 to change funding arrangements marked the beginning of a new era of assisting families rather than funding ECEC services directly (Harris, 2007). Much of the Federal ECEC funding focus was on increasing parents' workforce participation. By undertaking this move, Cass and Brennan (2003) note that operational subsidies for services were significantly reduced, and eligibility for fee assistance through Child Care Assistance and the Child Care Rebate was tightened and combined with a Family Tax Initiative. In 2000, the Child Care Benefit was introduced, replacing Child Care Assistance and the Child Care Rebate (Brennan, 2008). According to Brennan, the Child Care Benefit provided a

higher level of support to more families and increased the hours of care that could be claimed. The Child Care Benefit, Brennan added, targeted parents who were employed, studying or seeking employment.

Australia's Quality Agenda: Moving Toward a Focus on ECEC Practice

From 1993 the Federal Government required that long day care centres operating under the Child Care Program participate in a quality assurance process if families using the centre were to be eligible for fee assistance (Press & Hayes, 2000 p. 30). Press and Hayes noted that licensing, and health and safety continued to be the province of state and local jurisdictions, while the following structures were established to enact federal quality related policy directions:

- The National Childcare Accreditation Council (NCAC) was charged with overseeing the quality improvement and accreditation process for long day care.
- Support staff were employed by the Commonwealth to provide advice to long day care centres on accreditation matters and to coordinate the accreditation system.

Brennan (2008) confirmed the growing influence of the federal government at that time. The NCAC was an incorporated association, however, its chairperson and members were appointed by the Federal minister responsible for children's services (Brennan, 2008). The child care quality assurance system introduced as a "standard of quality beyond the minimum requirements described by licensing regulations" (NCAC, 2006, p. 4). Having a "beyond minimum" standard of care meant that for the first time the significant role of educators as curriculum decision-makers was alluded to in policy. Under the quality agenda the need for upgrading educator skills and knowledge became a priority for services attempting to meet the 52 high quality standards established under the Quality Improvement and Assurance System (QIAS). Australia was described in a report to the Organisation for Economic and Cooperative Development (OECD) by Press and Hayes (2000) as "unique in having a national, government supported, accreditation system for its long day care centres that is directly tied to the provision of funding, with over 98% of centres participating" (p. 39). The QIAS focused primarily upon the determining components of quality, and at the time of writing their report, Press and Hayes commented that the QIAS was under review. They noted that although the QIAS process had been widely supported there had been a number of concerns raised by service providers and the community. The concerns described by Press and Hayes focused on the consistency of the application of QIAS processes and the lack of penalties applied to services failing to achieve accreditation or failing to participate in the system.

The Child Care Advisory Council [CCAC] was charged with the task of conducting the review. Solutions were to "be within current funding arrangements where possible and be supported by a cost effectiveness analysis, exploring the impact on small business and on the Commonwealth" (Press & Hayes, 2000 p. 40) According to Press and Hayes, the Council consulted extensively during the course

of the review with the consultations showing strong support for the QIAS, and a widespread desire to maintain a high level of quality in child care centres, but also the need to make the process less complex, less time consuming and better coordinated with state licensing provisions. The Council's final recommendations, according to Press and Hayes aimed at streamlining and simplifying QIAS administrative requirements and ensuring greater validity and consistency in the accreditation process.

Press and Hayes (2000) noted that from 1 July 2000 early childhood policy would be broadened to fund eligible families in a wider range of family support services. The Family Assistance Act 1999 partially replaced the Child Care Act and through its Child Care Program was concerned with policy and funding in relation to long day care services (including family day care); multifunctional services and multifunctional Aboriginal services; some occasional care centres; and outside school hours care. This change in policy and funding was described by Press and Hayes as having other than workforce ideals by tagging funding to quality of care provided to children. In addition, there was a shift towards upgrading child care practice. Federal funding was made available for the provision of support, advice and training to the staff and management of services under the Child Care Program (Press & Hayes, 2000).

The new decade saw the responsibilities of the NCAC expanded to include family day care (2001) and outside school hours' care (2003) (NCAC, 2006, pp. 3-4), and in turn focus on the practices of educators working in these services. Based on educator feedback from the review of the accreditation system, the QIAS was streamlined in January 2002 to 10 overarching Quality Areas and 35 Principles. A standard 2.5 year accreditation was introduced at that time. While these changes made some differences it became evident that the quality process required further streamlining and educators required more assistance balancing their educational and care roles and complying with the QIAS system. A QIAS Source Book, and Quality Practices Guide were introduced in 2005 to provide additional information about practices that would inform the QIAS process. The quality standards were reduced from 10 to 7 standards. The first accreditation decisions were made under the 7 re-classified standards in July 2006. Further changes to the Child Care Quality Accreditation System (CCQAS) in 2006 included the introduction of unannounced validation visits, spot check visits between self-study reports, the employment of non-peer validators by NCAC, and the intended development of a more integrated CCQAS to promote consistency and equity across child care sectors. It could be argued that lessons learned from the introduction and revisions to the QIAS informed the development of the 2010 National Quality Standard (NQS) and legislation pertaining to the Standard.

The Birth of Australia's Unified Children's Agenda

Brennan (2008) outlined a range of political and policy activity from 2000 that steered the course of ECEC policy and practice over the years from 2001 to 2010. The appointment of the CCAC in 1998 was pivotal not only to reviewing and

initiating the changes to the quality assurance program, but according to Brennan, the future of ECEC in Australia. She noted that the CCAC was required by the Federal Government to investigate the likely child care needs of Australia after 2001 and to identify action which might need to be taken to ensure appropriate child care would be available (p. 39). The CCAC Report titled “Child Care: Beyond 2001”, advocated the reconceptualisation of child care to incorporate both care and education (CCAC, 2001). It recommended the creation of a National Children’s Agenda aimed at;

- recognising the importance of children’s early years,
- helping to retain and attract ECEC workers with skills,
- better ensuring equity of access to children’s services, and
- enhancing collaboration between levels of government and children’s services.

In 2003, the Federal Government released a consultation paper “Towards a National Agenda for Early Childhood.” A draft agenda was released in 2004 and the final agenda in May 2007 (Brennan, 2008). The Agenda established four action platforms: healthy families with young children; early learning and care; supporting families and parenting; and creating child-friendly communities (Australian Government, 2007, pp. 19-26). The early learning and care platform promoted parent involvement in early learning for children, consistency of ECEC systems across Australia, access to ECEC among the most disadvantaged children and the need for a skilled ECEC workforce (Australian Government, 2007, p. 21). Highlighting early learning was a landmark in Australian ECEC policy, and one that elevated informed pedagogical decision-making in debates that followed.

The federal election of November 2007 brought to power a Labor Government and into the new ministry a dedicated Parliamentary Secretary for Early Childhood Education and Childcare (Brennan, 2008). Brennan pointed out that prior to the election, the Australian Labor Party emphasised the need for education in children’s services policy at a federal level, declaring that “Federal Labor will put learning and development at the centre of Australia’s approach to early childhood education and care” (p. 30). Labor, she said, was committed to:

- developing universal pre-school for all four year old children for 15 hours per week;
- the creation of new long day care centres on the grounds of educational institutions (schools, universities and technical colleges);
- establishing new standards for ECEC quality; and
- increasing the number of qualified early childhood educators.

After the 2007 election, the scene was set for the Federal Government, under Labor, to work with the states to refine and create policies, agreements and a National Law to advance the national quality agenda beginning with the development of the Early Years Learning Framework (EYLF). The EYLF was and continues to be the catalyst for developing ECEC educators’ skills, practices and knowledge and taking up pedagogical leadership roles in their services.

On January 1st, 2012 the National Quality Framework (NQF) for early childhood services in Australia became fully operational. It formed part of a suite of policies that responded to social and educational imperatives that informed the discourses, and agreements driving the National ECEC Reform Agenda agreed to by Federal and State governments between 2008 and 2011. During these years, a comprehensive set of policies and strategies were developed and agreed to by the Council of Australian Governments (see COAG, 2009b). They included:

- The Council of Australian Governments’ Early Childhood Commitment
- National Quality Framework for Early Childhood Education and Care (NQF) including the Early Years Learning Framework (EYLF), and Framework for School Age Care
- Indigenous Children including Providing a Solid Start in School, Indigenous Preschools and Indigenous Early Childhood Development National Partnership
- Australian Early Development Index (AEDI)
- Early Learning and Care Centres
- Early Childhood Education – Universal Access including National Partnership Agreement on Early Childhood Education and Aboriginal and Torres Strait Islander Universal Access Strategy
- Early Years Workforce Strategy (EYWS)
- Home Interaction Program for Parents and Youngsters (HIPPY)

Overall, the policies, agreements and strategies listed above focus on much more than the nation’s economic business of ECEC related to parent workforce participation of earlier policies, or the later funding-associated links to quality care provision. The aims, guiding principles and rhetoric contained in the documents promote the need for ensuring that the nation’s children are well served. There appears to be some intent on the part of the Federal and State Governments to prioritise “learning” in ECEC services in order to meet the vision of the *Early Childhood Development Strategy* (ECDS) endorsed by COAG in July 2009. That is, “by 2020 all children have the best start in life to create a better future for themselves, and for the nation” (COAG, 2009a, p. 4). The delivery of this lofty vision falls on ECEC services and the educators responsible for creating the relationships and the environments where young children can get their “best start”. To this end a plethora of professional development strategies have been created to support educators in their pedagogical leadership roles. The content and processes of the professional development initiatives introduced across the sector are based on the research that informed the policies themselves. Several key research influences are discussed in the following section.

RESEARCH INFLUENCES ON CURRENT ECEC POLICIES AND PRACTICE

Australian ECEC policy and practice has been heavily influenced by the internationalisation of the ECCE agenda based on the results of brain research (National Scientific Council on the Developing Child, 2008; Schonkoff & Phillips,

2000), and early childhood economic investment research that has highlighted later pay-offs for money spent on children's health, well-being and learning in their early years (Galinsky, 2006). The 2001 CCAC Report made significant use of international studies to inform their recommendations to the Federal Government. Arguments have been made, however, for caution in the direct application of findings from elsewhere to ECEC in Australia. For example, Dahlberg, Moss, and Pence (1999) have raised several points about the need to examine in a critical way the perspectives used to evaluate quality and child outcomes in other countries. These authors prevail upon us to question results and problematise findings by relating our analyses to local social, political and philosophical contexts.

Significant research and evaluation has been conducted in Australia and elsewhere over the past decade specifically to advance the ECEC sector and inform policy. A meta-analysis by Gilliam and Zigler (2001) of ECEC evaluations conducted during the period 1990 to 2000 was used to inform a later social policy report by Brauner, Gordic, and Zigler (2004) for ECEC in the United States of America. These authors argued that an infrastructure that combines care and education must be built, either by placing educational components in the child care system, or by locating care into the educational system thereby achieving a more enduring approach. Brauner et al. also noted the need for reframing the relationship between care and education by changing the current terminology and constituency of child care and increasing parental and societal awareness of the components and benefits of quality care. They claimed that only when this happens, will the state of child care begin to improve. It would seem that Australian ECEC policy has attempted in part to reflect Brauner et al.'s recommendations. For example, the term "educators" is now used as a role descriptor for all staff working with children of all ages in ECEC services.

ECEC policies, practices, and research from elsewhere have played a major role in informing Australia's shift towards prioritising children's "best start". In its report to the Australian Federal Government, Boston Consulting Group's (2008) executive summary stated;

There is good evidence from trials and long term studies around the world that investment in basic early childhood services more than pays for itself ... Furthermore, evidence from other countries suggests that a more intensive integrated 'recipe' of services significantly enhances long-term prospects of more vulnerable children.

The Boston Consulting Group's report highlighted several strategies that other countries had adopted which have now been incorporated into Australian policy. Importantly, each of the strategies noted by the Boston Group had been informed by trials and long term studies. Strategies reported by the Group and adopted by the Federal Government include:

- Seeking greater integration of services (that is, from 2010 onwards, 39 integrated child and family centres will be built across Australia) (DEEWR, 2012)

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- Expanding early childhood services (note the target of 15 hours additional preschool for Australia’s children) (DEEWR, 2012)
- Developing national early childhood strategies (note the 2009 emergence of the NQF/EYLF in Australia)
- Consolidating early childhood services under one government department’s jurisdiction (note the COAG agreements that aim to consolidate arrangements between jurisdictions including the passing of legislation supporting the National Quality Agenda) (COAG, 2009b)

A number of debates about ECEC policy and practice in Australia have drawn upon successive reviews of OECD countries, where recommendations have been made for greater coherence in early childhood policies and services (Bennett, 2003; OECD, 2001, 2006). Press and Hayes (2000) wrote a summary of ECEC policy in Australia. Their “Report to the Organisation for Economic Co-operation and Development” contributed to the OECD agenda so that when comparisons were made Australia’s performance (or lack thereof) could be highlighted by ECEC advocacy groups. The use of recommendations from OECD Reports was evident in the development of the NQF (see for example, Victorian Curriculum Assessment Authority, 2008).

One consequence of regional variations in the delivery of early childhood education and care, according to Moore (2008), is that there is no guarantee of consistent outcomes for children across Australia. Moore argued for more consistent and coherent policies across early childhood sectors and greater cohesiveness and integration within and between services in order to achieve better quality programs and better outcomes for children. His argument is echoed by others (see also The Boston Consulting Group, 2008; Bennett, 2007; Doctors, Gebhard, Jones & Wat, 2008; Elliott, 2006; Press, 2008), and has had some impact on ECEC policy decision-making. What this has meant for ECEC educators across Australia is a commitment by governments at all levels to support, as well as measure through the NQF quality assurance process, their capacity to advocate for and to build nurturing relationships, curriculum decision-making, teaching and learning – that is their pedagogical leadership skills and knowledge (DEEWR, 2010a).

IN CONCLUSION: ECEC POLICY SHIFTS AND THEIR IMPACT ON PEDAGOGICAL LEADERSHIP

The impact of greater attention to the early years is evident in policy and practice. International research on the importance of the early childhood years to children’s future well-being and development has resulted in a children’s agenda. In Australia, information from such research has contributed to a number of reforms in areas concerned with the early years, and to a greater degree of interdepartmental collaboration and exchange. However, ECEC settings are complex. ECEC policy directions in Australia have aimed to provide increasingly comprehensive approaches to the provision of education and care (DEEWR, 2010b). Each of the state and federal agreements, the legislated quality requirements and the national curriculum

framework has taken pains to profile the complexity of children's lives. Initiatives in the ECEC reform agenda introduced in 2009 and fully operationalised on January 1, 2012, are intended to promote consistent early childhood practice in all ECEC settings. They are also aimed at breaking down the division between education and care by promoting the understanding that children's learning and development occurs in all contexts (DEEWR, 2010b).

The success of ECEC policy depends on how well ECEC services can enact and meet the intended policy outcomes. At the service level it requires pedagogical leadership. Current ECEC policies and practices in Australia have been based on a series of integrated reforms from past decades briefly described in this chapter. Tracing the history of policies and influences on ECEC policy-making and highlighting them here has provided some evidence of the need to understand the complexities underpinning the national reform agenda. Insights gained can provide a starting point for educators coming to terms with the National ECEC Reform Agenda, and for determining its success. In brief, ECEC policy informs pedagogical leadership in ECEC settings. Within the Early Years Learning Framework (EYLF) pedagogical leadership is related to educator's professional judgments based on their:

- professional knowledge and skills;
- knowledge of children, families and communities;
- awareness of how their beliefs and values impact on children's learning; and
- personal styles and past experiences (DEEWR, 2009, p. 11).

The EYLF is intended to guide professional conversations and embody the activity of pedagogical leadership. Well informed, reflective, and rigorous pedagogical leadership has the potential to fulfil much of the intended ECEC policy outcomes for Australia's children. How, and how well, this occurs will need to be the focus of future research, especially given the on-going debates (Edwards, 2007; Harcourt & Keen, 2012; Nutall & Edwards, 2007) about theories and evidence-based practices that contribute to individual and collective understandings about preferred pedagogies in ECEC.

Our position is that it is important to examine the progression of ECEC policies, research, debates and discourses that have led to, and informed, the current policy agenda. Insights gained provide a necessary a-priori step to developing pedagogical leadership in ECEC in response to the current National Quality Agenda for ECEC in Australia. This chapter has attempted to summarise two decades of ECEC policy changes and the rising focus on what educators do to make a difference in children's lives.

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SALLY GIACON & IAN HAY

PARENTS' EVALUATION OF AN EARLY LEARNING SUPPORT PROGRAM

Advances in science, through the fields of neuroscience, molecular biology, genomics and the behavioural and social sciences, confirm that the early years of childhood are a time of great potential, as well as a period of considerable risk (Rutter, 2002; Shonkoff, 2010). Equally it is now acknowledged that family environments and the challenges encompassed in parenting have changed from earlier times. The influences of the early years and the input from parents have the capacity to impact over a lifetime for an individual.

The family is acknowledged as the base unit of society. To quote Thornton, Axinn, and Xie (2007):

Today, as has been true for thousands of years, the family is still the primary unit of human interaction, providing the basis for both generational renewal and individual linkage to the larger society. (p. 3)

Over recent decades significant accelerated social and technological change has been experienced worldwide along with a growing global interdependence (Edgar & Edgar, 2008), all of which has impacted on parenting and family life.

Research evidence shows that, if health and/or education-related intervention are necessary, the earlier that intervention occurs, the more effective it is likely to be for that individual (Heckman & Wax, 2004; Knudsen, Heckman, Cameron & Shonkoff, 2006). This has led to a focus on the early years of schooling as being significant for children at risk for school failure (Kagan & Rigby, 2003).

A general research finding is that both parental care and pre-school education play a role in facilitating children's cumulative learning and development in the early years, with the home environment being a significant factor in this process (Waldfoegel, 2004). The *Effective Provision of Pre-School Education (EPPE)* project in the United Kingdom has reported that, while there is a correlation between the socio-economic status of the family and children's learning, this link is not causal. In terms of influences on children's learning, the *EPPE* report found that it was not the parents' socio-economic status as such that was important: it was what parents offered their children through the experiences they facilitated and the interactions they engaged in that were more influential (Melhuish, Phan, Sylva, Sammons, Siraj-Blatchford, & Taggart, 2008). Findings such as these highlight that supporting

parents in their role as primary caregivers and as the enduring educators of their children is beneficial, as families do have the capacity to support their children in a range of ways when they have the motivation, the means, and an understanding of how to facilitate their children's learning (Siraj-Blatchford, 2010).

As research by Peters, Seeds, Goldstein and Coleman (2007) has confirmed, involving parents in their children's pre-school education has benefits as it: (1) supports the child-parent bond; (2) encourages appropriate practices and attitudes relating to early development; and (3) contributes to parenting competence. Teachers, and others who work in early education and care settings, play a contributory role in supporting family cohesion and parental engagement, along with a role in linking families with other families (Peters et al., 2007). The role of parents as part of the educational team in schools is also acknowledged through the *Family-School Partnerships Framework* (Australian Government, 2008), which has been prepared by national parent bodies together with other interested stakeholders. This framework was developed to assist Australian school communities to build effective partnerships with families, as the evidence is consistent that, when schools and families work in partnership, children do better in school, stay in school longer, and like school more (Henderson & Mapp, 2002).

Since the quality of early childhood, and the experiences it holds, impacts powerfully on life, gaps in abilities open up very early across the socio-economic spectrum, and once established these gaps persist. As Heckman (2008) reported, "most of the gaps at age 18 that help to explain gaps in adult outcomes are present at age 5" (p. 7). Evidence is now available that the gap between children from affluent households and those from poorer households can be explained by their home environments and the quality of their parenting (Lexmond & Reeves, 2009). Family environments during children's early years influence skill development and the establishment of dispositions, which involve both cognitive and non-cognitive elements. Non-cognitive skills such as motivation, perseverance and resilience affect performance and influence the likelihood of success in the long term. Children from advantaged environments receive substantial additional investment in their early years as the knowledge, resources and connections available during this sensitive period of development allow for multifarious stimulation and the fostering of a broad range of skills – cognitive, social and emotional (Hay & Fielding-Barnsley, 2009). These various skills enhance social interaction and school engagement, and, in the longer term, future employment opportunities (Heckman, 2006).

There is also research that shows correlations between parents' perceptions of their parental competence and coping ability as parents, their optimism with regard to making a difference to their child's development, the pleasure they derive from the parenting role, and their willingness to engage with their children's education (Australian Institute of Family Studies, 2006; Scott, 2000). Supporting parents to understand more fully what parenting contributes to child development and the

importance of the parent-child bond has significant relevance in the context of social and educational support provided to families. Fostering high parental self-efficacy can influence parents' willingness to engage with their children's educational progress and be involved with the school (Sanders & Woolley, 2005).

In the United States, the High/Scope Perry Pre-school Program (Schweinhart, Barnes, & Weikart, 1993) reported that children's participation in a high quality pre-school program that incorporated parent inclusion and involvement demonstrated significant benefits to the children. The evidence from this program was that such interventions can promote the acquisition of social skills and integrate disadvantaged people into mainstream society, while fostering long-term improvements in the home environment supportive of early learning. This pre-school intervention affected both children and their parents, with parents improving their education and labour force activities and reducing their reliance on welfare. As Heckman (2000) noted, "the successful enriched programs like Perry Pre-school foster long-term improvements in the home environment which carry over to the child long after the program has terminated" (p. 31).

While the value of early childhood teachers' working in partnership with parents is well documented in the research literature, there is still uncertainty as to how to engage in this partnering, given that often the parents whose children need the highest level of assistance are the least likely to engage in that support even when it is available (Homel, Elias, & Hay, 2001). This issue is a concern within the Australian educational context, and different jurisdictions and authorities have used a variety of approaches to try to deal with it (Australian Government, 2009). The intention of the current study was to focus on the Tasmanian early intervention initiative called *Launching into Learning (LiL)*, which was designed to both enhance the education of children considered at risk of school failure, and engage and support their parents as the children's primary caregivers and ongoing educators.

METHODOLOGY

In this study the core research instrument is a specifically constructed parents' questionnaire designed to collect quantitative and qualitative data about the adult participants' perspective on the *LiL* program. The program provides early learning experiences for children before they start formal school. The program's sessions have a strong language and social development component. A dual challenge for teachers and schools is to offer interventions that are appropriately child-focused while engaging and supporting parents in their role. This dual challenge is at the core of this research study and this study aims to explore parental perspectives on a prior to school program currently operating in a large number of government schools in Tasmania, to investigate what parents think about the program and to understand what parents perceive such a program offers them and their child.

Participants

This research was conducted in a random sample of government schools in southern Tasmania that offer the *LiL* program. A total of 87 parents and caregivers attending a *LiL* session at one of these schools completed the *Parental Perspectives Questionnaire* of the *Launching into Learning* program, designed for this study, while attending the session. Information on the characteristics of this cohort of participants is provided in the results section.

Instrument

The study commenced with the development of a questionnaire to facilitate data gathering from parents participating in the *LiL* program. This *Parental Perspectives Questionnaire* of the *Launching into Learning* program was developed as a tool through which parents could indicate their thoughts and make comments on the *LiL* program without impacting noticeably on their interactions with their own child as they participated in a session. With this in mind, the questionnaire was designed to take less than ten minutes to complete, and the layout and the number of questions were chosen so as not to appear too complex to parents. The language of the questionnaire was intentionally kept simple to accommodate a range of literacy proficiencies.

The parents' questionnaire commenced with eight questions intended to gather demographic information from respondents. This introductory section of the survey was followed by 24 questions which required answers through the use of a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

Procedure

To uphold research integrity, ethical approval for the research was gained from the *Southern Tasmania Social Sciences Human Research Ethics Committee* through the University of Tasmania. The research also had permission and approval from the Department of Education, Tasmania, and satisfied department criteria for *Conducting Research in Tasmanian Government Schools and Colleges* (2006). All adults who attended the *LiL* session on the day of data collection were approached to complete a questionnaire. Participants were approached by the researcher or the *LiL* co-ordinator, following a verbal introduction to the study at the start of the session. Parents were provided with a folder that contained a participant information sheet, a consent form and a copy of the *Parental Perspectives Questionnaire* of the *Launching into Learning* program. Participation was completely voluntary.

RESULTS

Data were collated from the responses to the *Parental Perspectives Questionnaire* of the *Launching into Learning* program. The quantitative items were statistically

analysed using the computer program, the Statistical Package for the Social Sciences (SPSS, 2009). The qualitative data were reviewed to identify recurring comments, or themes, nominated by parents in their responses. The data were organised through this themed approach and the frequency of common themes is the main output of this analysis.

Demographic Sample Information

The sample consisted of 7 fathers ($M = 40.3$ years) and 80 female respondents, of whom 76 were mothers ($M = 31.2$ years) and 4 had other roles (of grandmother or great-grandmother). This random sample of parents participating in the *LiL* sessions with their child collected responses from families living in 25 suburbs, with the average SEIFA (Australian Bureau of Statistics, 2006) value for these suburbs being 919.48. SEIFA stands for Socio Economic Indexes for Areas and is a tool used by the Bureau of Statistics to measure the overall welfare of Australian communities. The average SEIFA score is 1000 and a lower score indicates a higher level of socio-economic disadvantage within an area. The families represented in this sample had, on average, 2.2 children per household.

The data showed that 50.6% of parents had heard of the *LiL* program through a school; some parents had heard of it because they already had children at school. The remaining respondents had received information on this pre-school program from health professionals (health nurse, clinic nurse), friends, or through written materials such as newsletters, newspapers and pamphlets. Within the respondent group, the parent and child attendance at the *LiL* sessions ranged from “a total of five sessions” to “three times a week for three years.” Over 39% of the participants said they had been attending *LiL* sessions for more than one year.

Parental Survey Responses

Statistical analysis of parents' responses to the questionnaire items showed the highest mean response was received for question 11: “The *LiL* co-ordinator is friendly and helpful” ($M = 4.76$, $SD = .55$) and question 24: “I think by being involved with my child it will support him/her to do better at school” ($M = 4.76$, $SD = .42$). The lowest mean response was received for question 10: “I get ideas from the other parents that I see at the *LiL* sessions and I use these at home” ($M = 3.75$, $SD = 1.07$) and question 17: “I think it is best to keep home issues separate from the school issues” ($M = 3.75$, $SD = 1.13$). Reported in the following table are the means and standard deviations of the responses from the 87 parents who completed this questionnaire. Overall these data confirm that parental perceptions of the *LiL* sessions were positive, with a generally narrow range of opinions across the sample group, as demonstrated by low standard deviation scores per item.

Table 1. Means and standard deviations for responses to the Parental Perspectives Questionnaire of the Launching into Learning program (N = 87)

<i>Parental Perspectives Questionnaire (PPQ) items</i>	<i>M</i>	<i>SD</i>
1 The LiL sessions help prepare my child for school	4.70	.53
2 The LiL sessions help my child mix with other children of a similar age	4.72	.52
3 The LiL sessions give parents time to focus on their child	4.57	.58
4 The LiL sessions help me to get to know the school	4.47	.69
5 The LiL sessions allow parents to mix with other parents	4.67	.54
6 The LiL sessions help me become a better parent for my child	4.09	.90
7 I am already aware of how to help my child	4.26	.77
8 The LiL sessions have given me information and ideas on how to help my child	4.13	.76
9 I use ideas from the LiL sessions at home	4.06	.89
10 I get ideas from the other parents that I see at the LiL sessions and I use these at home	3.75	1.07
11 The LiL co-ordinator is friendly and helpful	4.76	.55
12 I find the other school staff I come into contact with (teacher assistant, office staff, school principal) friendly and helpful	4.56	.73
13 I think connecting home and school, through sessions like LiL is useful for families, even before children are enrolled into school	4.71	.50
14 The LiL physical environment is welcoming and easy to be in	4.62	.55
15 I am accepted by the group at the LiL sessions	4.68	.51
16 The LiL sessions offer me something as well as my child	4.39	.72
17 I think it is best to keep home issues separate from the school issues	3.75	1.13
18 The LiL sessions confirm for me that I am a good parent	4.08	.93
19 I compare what I do with my child with what goes on in the LiL sessions	3.80	.88
20 The LiL sessions are a teaching program aimed at families (parents and children)	4.34	.78
21 The LiL sessions are firstly aimed at the children	4.40	.67
22 The LiL sessions are for mixing with other families	4.20	.74
23 The LiL sessions are for children's learning	4.64	.52
24 I think by being involved with my child it will support him/her to do better at school	4.76	.42

DISCUSSION

The core aim of the study was to identify what the *LiL* program provided for families. The consistent findings from parents' responses to the *Parental Perspectives Questionnaire* of the *Launching into Learning* program affirmed that parents valued the *LiL* program and were able to identify benefits for themselves and their child by attending it. The findings of this study showed that the parents viewed the *LiL* program as (1) contributing to their child's development and their child's preparation for school; and (2) positive for them as parents due to the opportunities it provided for focused interactions with their child and other parents.

Benefits for Children

Parents' responses highlighted that these pre-school sessions were helpful for their child by fostering independence, confidence and peer companionship; and, by providing a valuable extension of the home setting, parents perceived that the *LiL* program helped prepare their child for school as the sessions allowed for opportunities to focus on the child, offering time for skills and dispositions to be fostered. These responses are consistent with the literature, which confirms that, for school success, both cognitive and non-cognitive skills are important (Jeynes, 2005), and positive experiences early in a child's life do contribute to optimising development and enhanced outcomes over the life course (Knudsen et al., 2006).

Benefits for Parents

The data in the present study demonstrated a number of positive aspects to attending the *LiL* sessions for parents, including time to focus on their child as well as opportunities to gain information and ideas for use at home to support their child's development and learning. Also confirmed through the responses given to the questionnaire was that the *LiL* sessions extended parents' knowledge and understandings of their parenting role. Consequently parents believed these sessions helped them to become better parents. These responses align with the literature, which references the relevance of interventions that assist parents to realise their significance with regard to learning as well as caregiving (Sanders & Woolley, 2005), and the importance of parents and teachers participating together in pre-school programs (Peters et al., 2007).

Some parents in the sample group had attended this program over a number of years, which was a further affirmation that parents valued and enjoyed this program. The data from this study correlates with the findings of the Department of Education's longitudinal research into the *LiL* program (Department of Education, Tasmania, 2010), which showed that parents value the program and actively formed friendships through it.

CONCLUSION

This study, informed by the parental voice and referencing international research and empirical evidence, confirms the value of working in concert with families in supporting children to have the best possible start in life, in supporting parents in their pivotal societal role, and in supporting schools to reach their educational aims for students. As the early years of childhood hold such relevance for success in school and life linking parents and professionals from early on is desired to support positive outcomes for both children and their parents.

The early education and care agenda in Australia, as in the *LiL* program, acknowledges parents in their complex and demanding role of raising children and in their enduring position as educators for their children. This agenda has given rise to renewed consideration of how professional roles, such as that of the teacher, may offer support to parents through the establishment of meaningful collaborations with them prior to their children's formal enrolment in school. The challenge of offering positive child-focused intervention alongside genuine parental engagement was at the core of this research study, as it is not possible to meet the interests of schooling without linking to the interests of parents.

The responses from parents participating in the *LiL* program collected through this research have affirmed that parents value participating with their children in a context supported by teachers and other parents. The *LiL* program is less about offering formal scripted sessions to children and their parents and more about building relationships; less to do with formal teaching and more to do with offering additional learning opportunities for children and their parents outside the home context. Parental perceptions captured through this research have confirmed the value of the *LiL* program for children in their early years as an opportunity through which parents may focus on their children, and as a mechanism for gaining information and ideas to support early learning and development. Parents confirmed that both of these aspects, offered through sessional participation, have assisted in preparing their children to navigate the school entry milestone.

This study into an early intervention program operating in Tasmania highlights the potential of teachers and their schools, during the pre-school years, to contribute positively to children's development, and their parents' role as first and enduring educators. Valuable opportunities can be created, most particularly for children at risk for school failure, if schools and teachers connect with parents and their children before the time of compulsory school entry. This research has relevance for the future of early education in relation to family and community outreach, with regard to the types of programs that may be offered by schools, along with understandings which have the potential to inform teacher training programs and the development of family-school partnerships. Offering early opportunities for children with their parents to connect to teachers and schools is contributory to a positive start at school and fosters ongoing educational engagement. Optimal early childhood development

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and achievement of the goals of early education benefit from meaningful interactions with the parents of the young.

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ROHAYATI MOHD ISA & JOHN WILLIAMSON

**FACTORS INFLUENCING AN INDIVIDUAL'S
DECISION TO DONATE TO A STATE UNIVERSITY:
A CASE STUDY OF TWO UNIVERSITIES**

Higher education needs sustainable forms of funding to operate successfully. As government funding is limited (Morshidi & Sarjit, 2007) and may reach the maximum at some near point in time, state (and other) universities have acknowledged that they must develop additional revenue streams (Bloland, 2002; Mora & Nugent, 1998). An increasingly important financial stream to higher education now evident is philanthropy (Cutlip, 1990; Hall, 1992; Johnstone, 2004; Prince & File, 1994); that is, donations from the general public to the universities for either specific or non-tagged purposes. To date the evidence is that Australian universities have performed rather poorly in attracting philanthropic funds and donations and bequests represent less than 1.5 per cent of the universities' revenue (Allen Consulting Group, 2007). A study conducted on individual giving in a state in Malaysia (Bustamy, Fernandez, Abdul Rahim, Cheah, & Nadarajah, 2002) indicated that individuals prefer to contribute to religious purposes and only 24 per cent of the sample preferred to give to support education. Studies showed that success in raising funds from voluntary supporters depends heavily on the institution itself in attracting donors to give (Allen Consulting Group, 2007; European Commission, 2007). Universities need to be creative in their fund-raising approaches by understanding the donors' interests, the concerns that they have, and their giving potential (Haggberg, 1992). Thus, to understand donors' giving behaviours raises important questions such as; are the factors influencing donor's giving behaviour similar across countries? This chapter investigates the reasons for donors' giving to two state universities across two countries with different cultural and societal backgrounds – Australia and Malaysia.

SIGNIFICANCE OF THE STUDY

Despite the growing importance of philanthropy to higher education across the world (Barr, 1993; Brittingham & Pezzullo, 1990; Fransen, 2007; Jacobs, 2007), there is thus far no study conducted to investigate factors influencing individuals giving to Malaysian universities. Similarly in Australia, despite the growing research on philanthropy (Kym & Wendy, 2006; Madden, 2006; Scaife, 2006; Scaife, McDonald, & Smyllie, 2011), studies have investigated some public higher education institutions but they are not comprehensive or extensive. Given that

the area of philanthropy to public universities in Malaysia and Australia is under-researched, the findings of this study are important for several reasons: (i) to increase the awareness among university advancement administrators of the determinant factors influencing donors' giving behaviour and profile, (ii) to enhance knowledge and understanding of universities' fundraisers' or donors' giving behaviours, and (iii) to add knowledge to other state universities within Malaysia and Australia and elsewhere in attracting voluntary giving by learning from one another and through policy adaptation and modification, in order to understand the differences in the problems they encounter.

WHAT DO WE KNOW FROM THE LITERATURE?

Voluntary action for the public good appears in every society and it appears different cultures and nations have their own philanthropic traditions (Robert & Michael, 2008). Previous studies have often reported the factors that make donors more likely to donate are demographic factors (Wastyn, 2008). The demographic factors reported as underlying a gift decision are: age, gender, marital status, race, ethnicity, religion, and number of children. Studies have reported that there is a relationship between, age and giving (Charles, Frank, & Keith, 2002; Clotfelter, 2001), religion and giving (Lyons & Nivison-Smith, 2006), and income and giving (Lindahl & Winship, 1992; Tsao & Coll, 2005), and race and ethnicity and giving (Hodgkinson & Weitzman, 1998), and the number of children and giving (Keller, 1982). Research on higher education philanthropy indicated that women may volunteer more than men (Hardy & Taylor, 1995). Though evidence is mixed, marriage is found to be positively related to giving (Randolph, 1995). Socio-economic characteristics found to have direct relationships with giving are: income (Chua, 1999), tax advantages (Chua, 1999; Haggberg, 1992; Steinberg, 1990) and education levels (Jencks, 1987). Research showed a direct relationship also exists between age, income and giving because people are more likely to give and accumulate wealth as they age (Wastyn, 2009). Dugan, Mullin, and Siegfried (2000) suggested that giving is associated with an alumni's level of financial burden in funding their education; loan recipients gave less to the institution while academic scholarships holders tend to increase their gift size. In addition, increases in educational attainment are found to be directly correlated with increased giving (Jencks, 1987).

Donors' motives for giving are complex and personal with multiple purposes and causes (Frumkin, 2006) and can be categorised into internal and external motivations. Studies show that internal motivation factors influencing giving includes when something is desired, or to satisfy a need; and external motivations, which come from persons, events, or conditions in the environment (Mixer, 1993). Other studies report that donors are more likely to donate because of personal experiences, and 'trigger' events such as a sense of gratitude (Wastyn, 2009). External motivation factors found to influence giving are the organisation's mission that matches donors' values and are of importance to them and donors' interest in the difference

that their contributions can make (Lindahl, 2010). It has been reported that donors give to universities or colleges because of particular educational causes (Ostrower, 1995). While Liu (2006) reported that national universities being ranked highly is significantly positively associated with the proportion of total private giving. Alumni who are more emotionally attached to the Alma Mater are more likely to donate (Beeler, 1982). In addition, external factors such as government policy and material incentives have been found to have an influence on giving. Brooks and Lewis (2001) reported that the level of trust in government has a positive relationship with giving.

BACKGROUND TO THE STUDY

Philanthropy in the Australian Higher Education System

Australian society is comprised of a variety of cultural, ethnic, linguistic and religious backgrounds (Department of Foreign Affairs and Trade, 2008). While Australians think of themselves as generous, the culture of giving is more a private than a public activity (Allen Consulting Group, 2007). The *Giving Australia* report showed that individuals and businesses in Australia are more likely to give to community service or welfare, health, arts and culture, sports and recreation before giving to education (all sectors) (Department of Family and Community Services, 2005).

Acknowledging the significance of voluntary giving, the Commonwealth Government in 2007 established a set of national best practice guidelines for philanthropy as it strives to develop a culture of giving to the higher education sector (Allen Consulting Group, 2007). Hence, to attract public donation, all Australian university trusts and foundations hold Deductible Gift Recipient Status if they meet the criteria set by the Australian Tax Office (Allen Consulting Group, 2007). Australian individuals are reluctant to talk about their wealth and this presents challenges for Australian universities as they seek to compete in an increasingly global market for students, staff and community engagement in the context of decreasing government funding.

Philanthropy in the Malaysian Higher Education System

Malaysia is a multi-racial society, comprised of Malays, Chinese, Indian and other ethnic groups. The concept of giving for the benefit of others can be identified in the four main religions practised by the people: Islam, Christianity, Buddhism and Hinduism (Cheah, 2002) and offer a strong foundation into the giving tradition in the society. Religious beliefs, cultural practices and ethnicity of the people have formed a strong foundation for the benevolent tradition in the society (Fernandez & Nadarajah, 2002).

Recognising the potential of alumni and philanthropic contributions as a substantial source of university funding, the Malaysian universities were encouraged by the

government to seek alternative income which includes endowments and alumni and philanthropic contributions (Johari, 1998). With the government taking the lead, the giving phenomenon to support the public universities is slowly changing. To attract public donation, all donations given to the universities are tax exempted under the Malaysian Tax Law (Fernandez & Abdul Rahim, 2002). In recent times, some of the Malaysian universities are beginning to establish an Advancement portfolio, and form foundations to govern the direction of philanthropic funds.

METHODOLOGY OF THE STUDY

Conceptual Framework

Van Slyke and Brooks' (2005) model of decisions to behave charitably was adapted as the framework for the study (see Figure 1). While it is evident the reasons as to why people give is multi-factored, it is important to try and understand the individual motivations (Schervish, 2005; Van Slyke & Brooks, 2005).

The study was conducted in a state research intensive university in Malaysia, named *University I*. At the time of the study, the university had around 20,000 alumni and approximately 400 donors registered in its database. In the Australian context, the study was conducted in a state university, named *University II*. To date, there are around 50,000 alumni scattered over the globe and approximately 1300 donors listed in the university's database in 2010. These institutions were a purposeful sample as there are similarities between them that fits the characteristics of the study; (i) status: state University, research intensive; (ii) similar capacity: total endowments, number of student enrolments; (iii) geographical location: island state university; and (iv) initial stage in Institutional Advancement agenda: Advancement Office is less than 5 years old.

Research Design and Questions

A qualitative research approach and case study method allowed for the investigation to create a snapshot of the current state of affairs (Stangor, 2010, p. 20). The case

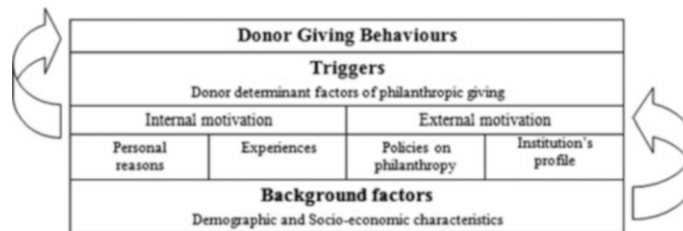


Figure 1. Conceptual framework of individuals decision to behave charitably to public higher education institutions (Source: Adapted from Van Slyke & Brooks, 2005, p. 206).

study method was chosen as it allowed an in-depth study of a bounded phenomenon: the case study institutions and the unit of analysis were the individual donors and non-donors (Creswell, 2003). This study explored: (i) background factors (demographic and socio-economic characteristics), (ii) external factors (policies on philanthropy and institution's profile), and (iii) internal factors (personal reasons and experiences) that trigger donors' and non-donors' giving decisions to the case study universities.

Instruments

An online survey and an in-depth interview were used as the instruments in the data collection process. Section one of the survey sought demographic information from the individual donors. However, religion and race were not included in the context of the study for *University II* because of the perceived difficulty in obtaining the data. Section two required responses to questions about three possible determinant constructs influencing giving: (i) the philanthropy policy: involved items on tax saving incentives, government policy, and matching gift practices; (ii) donors' personal reasons and experiences: comprised items on personal principles, social responsibility, public relations, showing of gratitude and loyalty to the university; and (iii) the institution's profile: involved items on university's ranking, senior institutional leaders, students' achievements, vision and mission, financial position, academic achievements, the fund raising campaign, research achievements, corporate values, alumni achievements, other donors contributing to the university, the university's fundraising approach, and the donors' preferred university. The data collection occurred over a one-year period.

Sample

Purposive sampling was utilised. This procedure starts with a purpose in mind and the sample is selected based on this purpose to include people of interest and exclude those who are not (Given, 2008). Samples were identified based on the active list of Donors and Alumni residing in the universities' database. To qualify to participate in the survey, donors were chosen based on their status (university's alumni, staff currently working with the university, retired from the university), and other individual donation history (donated to the Universities from 2006 to 2010 or had never donated to the Universities) and aged between 20 to 80 years. Survey respondents were invited to participate in an on-line survey published on the respective university webpages. Two hundred and eleven individuals voluntarily agreed to participate by completing the survey; they were 82 donors and 53 non-donors for *University I* and 14 donors and 62 non-donors for *University II*. A random sampling method was used in identifying the interview participants of the study. Participants were approached by the Director of the

University Advancement and Alumni and 17 individual donors voluntarily agreed to participate in an in-depth interview session; they were 10 *University I* donors and 7 *University II* donors.

Statistical Methods

The study employed non-parametric statistical techniques to analyse the survey data based on three assumptions: (i) the data were relatively small (Pallant, 2011), (ii) the sample could not be regarded as a random sample (Burns, 2000) since on most items the distributions of data was negatively skewed and the scores fell towards the high end of the scale, and (iii) most of the survey items were designed to measure on nominal (categorical) data: Section 1 Demographic Information; and ordinal (ranked) data by means of a Likert scale: Section 2 Giving Incentives (Burns, 2000). Chi-square tests for independence were used to explore the relationship between the categorical variables (Pallant, 2011). While Mann-Whitney rank-sum test comparing ranked scores (George & Mallery, 2003) were used to test for differences between two independent groups: donors and prospective donors on factors influencing giving decisions (Pallant, 2011).

Thematic Methods

The interviews were recorded and transcribed, then analysed using the thematic method (Gibbs & Flick, 2007). A total of five themes were identified to provide the factors in influencing individuals giving to the universities: personal internal motivations, Government policies to promote giving, social and cultural context, organisation identity, and religion giving. These factors are discussed together with the quantitative data.

FINDINGS

Individual Background Factors

Demographic characteristics. The *University I* total survey respondents consisted of 61 per cent males and 39 per cent females, with 60 per cent aged between 21 to 40 years, 61 per cent were married, 41 per cent were without children, and 81 per cent Malays and practising Muslims. At *University II*, the total respondents comprised of 43 per cent males and 57 per cent, females, 43 per cent were aged between 41 to 60 years, 62 per cent of them were married or living with a partner, and 46 per cent were without children. [Table 1](#) summarises the data from the survey based on the level of significance of the respondent demographic characteristics using the Chi-Square test of independence. The results showed that age, marital status, number of children, religious affiliation and race are statistically significant for individuals' at *University I*. However, only age is statistically significant for individuals at *University II*.

Table 1. Individual's demographic characteristics and level of significance

Demographic characteristics	University I	University II
	Asymp. Sig. $p < 0.05$	Asymp. Sig. $p < 0.05$
Gender	0.469	0.558
Age	0.000	0.010
Marital Status	0.000	0.147
Number of children	0.000	0.147
Religious Affiliation	0.037	-
Races	0.014	-

Socio-economic characteristics. University I reported 63 per cent with an income of less than \$50,000 per annum, 90 per cent of respondents were employed and 49 per cent were degree holders. At University II, 45 per cent of the respondents had an annual income of less than \$50,000, 64 per cent were employed and 53 per cent had a degree. The results from the Chi-square test of independence showed that individual yearly income, having a doctoral degree and getting support through loans, scholarships and parents during their studies were statistically significant for sample at University I. However, the results for University II individuals showed no statistically significant difference across all socio-economic characteristic (see Table 2).

Table 2. Individual's socio-economic characteristics and level of significance

Socio-economic characteristics	University I	University II
	Asymp. Sig. $p < 0.05$	Asymp. Sig. $p < 0.05$
Yearly income	0.001	0.309
Employment status	0.221	0.898
Education background		
Primary	0.467	0.760
Secondary	1.000	0.760
Diploma	0.076	0.520
Bachelor degree	0.110	0.755
Master degree	0.098	0.056
Doctoral degree	0.050	1.000
Study support mechanism		
Loan	0.001	1.000
Working part-time	0.648	0.549
Scholarship	0.027	0.553
Parents	0.023	0.120
Working full-time	1.000	0.217

DETERMINANT FACTORS OF PHILANTHROPIC GIVING

Groups Means Ranks Compared

Table 3, 4, 5, 6, and 7 shows the results of a Mann-Whitney test of difference in mean rank scores across donor and prospective donor groups. Three groups of factors are considered: personal internal motivations, government and public policies on philanthropy, and institutional profile.

Personal Internal Motivations

The results in Table 3 show there are no observable difference between donors and prospective donors in median ranking across the personal internal motivation factors (showing gratitude to the university and loyalty to the university) at *University I* and *University II*. However, the differences between the mean rankings at *University I* are statistically significant in personal principles, social responsibilities and public relations at 0.05 level of significance but not at *University II*. Therefore, since the personal principles, social responsibilities, and public relations factors are significant, we can conclude that it is very likely that these factors will promote giving among the respondents at *University I*. However, the same cannot be said of the respondents at *University II*.

Table 3. Comparison of mean rank scores based on personal reasons and experiences – Between groups

Factors	University I			University II		
	Donors	Prospective Donors	Asymp. Sig.	Donors	Prospective Donors	Asymp. Sig.
	Mean Rank	Mean Rank	$p < 0.05$	Mean Rank	Mean Rank	$p < 0.05$
Personal principles	65.04	43.42	0.000	35.86	30.90	0.338
Social responsibility	61.46	49.46	0.039	31.14	32.24	0.837
Public relations	52.20	65.12	0.036	31.11	32.26	0.818
Showing gratitude to the university	56.96	57.06	0.988	36.36	30.76	0.302
Loyalty to the university	57.85	55.56	0.707	34.93	31.16	0.478

The results, from the interviews with donors revealed that all participants from both universities chose to give to the University because of personal reasons or due to a particular cause. For example, having an emotional connection with the University and sense of loyalty to the University, as described by a Senior University Administrator of *University II*.

I contribute to the university because I've got a loyalty to the university. I'm giving to the university because it's my university and because I work here. (U2-Donor₃)

Government and Public Policies on Philanthropy

The results in Table 4 show there are no observable difference between donors and prospective donors in median ranking for tax savings incentives factors at University I and University II. However, the differences between the mean rankings at University I are statistically significant in government policies on philanthropy, and matching gift policy but not at University II. Since these factors are significant, we can conclude that it is very likely that government policies on philanthropy and matching gift policy will promote giving among the respondents at University I but not among the respondents at University II.

Table 4. Comparison of mean rank scores based on Philanthropy Policy – Between Groups

Factors	University I			University II		
	Donors	Prospective Donors	Asymp. Sig.	Donors	Prospective Donors	Asymp. Sig.
			<i>p</i> <0.05			<i>p</i> <0.05
	Mean Rank	Mean Rank		Mean Rank	Mean Rank	
Tax savings incentives	51.53	62.18	0.082	33.54	30.96	0.639
Policies on philanthropy	50.25	64.34	0.020	29.00	32.16	0.562
Matching gift	49.82	65.06	0.013	25.08	33.20	0.133

Results from the interviews indicated that tax and matching incentives on giving did not influence all the interview participants of University I to give while two donors of University II reported tax benefits will be an important incentive for them when they retired from service.

Institution's Profile

Institution's profile factors influencing giving decisions were categorised into: Institution's reputation, Institution's achievements, and Institution's management style.

The results in Table 5 show there are no observable differences between donors and prospective donors in median ranking across the university's reputation factors (leaders, and financial position) at University I and University II. However, the differences between the mean rankings at University I is statistically significant in the university's ranking but not at University II. Since the university's ranking is significant, we can conclude that it is very likely that this factor will promote giving among the respondents at University I. The same, however, cannot be said of the respondents at University II.

Table 5. Comparison of mean rank scores based on Institution's Profile: University Reputation – Between Groups

Factors	University I			University II		
	Donors	Prospective Donors	Asymp. Sig.	Donors	Prospective Donors	Asymp. Sig.
	Mean Rank	Mean Rank	$p < 0.05$	Mean Rank	Mean Rank	$p < 0.05$
Ranking	51.13	63.70	0.040	25.64	29.20	0.492
Leaders	53.22	60.40	0.235	24.95	29.37	0.405
Financial position	53.79	59.50	0.340	27.41	28.77	0.800

The results in Table 6 show there are no observable difference between donors and prospective donors in median ranking across university's achievement factors at *University I* and *University II*, apart from research. However, the differences between the mean rankings at *University I* is statistically significant in the university's research achievements but not at *University II*. Therefore, it can be concluded that it is very likely that the university's research achievements will promote giving among the respondents at *University I* but not of the respondents at *University II*.

Table 6. Comparison of mean rank scores based on Institution's Profile: University Achievements – Between Groups

Factors	University I			University II		
	Donors	Prospective Donors	Asymp. Sig.	Donors	Prospective Donors	Asymp. Sig.
	Mean Rank	Mean Rank	$p < 0.05$	Mean Rank	Mean Rank	$p < 0.05$
Student	56.33	55.48	0.882	25.23	29.30	0.442
Academic	51.70	62.80	0.062	25.00	29.30	0.417
Research	49.99	65.50	0.010	26.14	29.08	0.582
Alumni	52.02	62.29	0.089	25.09	29.33	0.427

The results in Table 7 show there are no observable difference between donors and prospective donors in median ranking across the university's management style factors at *University I* and *University II*. However, the differences between the mean rankings at *University I* are statistically significant in the university's corporate values at 0.05 level of significance but not at *University II*. Therefore, since the university's corporate values factor is significant, we can conclude that it is very likely that this factor will promote giving among the respondents at *University I*. The same, however, cannot be said of the respondents at *University II*.

Table 7. Comparison of mean rank scores based on Institution's Profile: University Management Style – Between Groups

Factors	University I			University II		
	Donors	Prospective Donors	Asymp. Sig. $p < 0.05$	Donors	Prospective Donors	Asymp. Sig. $p < 0.05$
	Mean Rank	Mean Rank		Mean Rank	Mean Rank	
Vision and mission	53.14	60.52	0.220	21.05	30.32	0.081
Fund raising campaign	59.96	49.73	0.088	29.68	28.21	0.782
Corporate values	51.21	63.57	0.041	24.50	29.48	0.353
Fundraising approach	58.04	52.78	0.387	27.55	28.73	0.823
Other donors' contributions	52.47	61.58	0.137	25.45	29.24	0.449
Donors' preferred University	55.24	57.20	0.746	34.14	27.12	0.189

The interview data, however, suggested that the individual donor-participants perceived the strength of the university, the university's ranking, University's Brand, and their relationship with the university among the factors contributed to their giving to the *University I*. The *University II* data showed that donors were satisfied with the University's fundraisers, University's Brand and the reputation of the University's Foundation.

Social and Cultural Context

Donors from both universities indicated having the capacity to give without expecting anything in return. Donors also perceived the respective country's philanthropy culture in relation to the universities as one of the challenges facing the universities to attract donations. Custom and practice based on how an individual was raised also plays an important role in an individual's giving behaviour. At *University I* a staff donor described his giving behaviour as being inspired by the giving principles demonstrated by his father.

The Malaysian people are considered "quite sympathetic" in helping others as commented by a Senior Professor of *University I*. While in the Australian context, a donor described the perceptions of the people of Australia on the idea of philanthropy and contributing to the University as:

We are not used to philanthropy, people think of it in huge terms and not in manageable terms and again I think communication of that, the idea that you can contribute a small amount is important. (U2-Donor₃)

Religious Giving

The culture of giving can be identified in the religions practised in Malaysia as commented by all donors of *University I*. All the Muslim donor participants of *University I* perceived supporting the University through the *zakat*; a yearly purification tax, signifies an alms-tax that might purify and sanctify wealth (Al-Quran 9:130) (Hasan, 2010) by helping the University's poor students.

DISCUSSION

The data suggests some similarities and significant differences in relation to philanthropy in the case study universities. For example, the factors from the literature relating to giving are more evident in one institution than the other. Overall, however, the factors are found broadly to be similar to those reported in the previous research.

Individual Background Factors

Age, marital status, number of children, race and religion are shown to be the strong demographic characteristics of individuals at *University I* and this is similar with findings in many previous studies. Similarly, there is a relationship between religion and giving among the individuals involved with *University I*. At *University II*, however, only age was shown to be the demographic characteristic related to individual's giving. Previous studies showed that an individual's income had a direct relationship with age and giving because people are more likely to give and accumulate wealth as they get older (Wastyn, 2009). This finding confirmed the results found for individuals at *University I*. Contrarily, at *University II*, income was not shown to be related to the individual's giving and thus confirmed the suggestion made by Van Horn (2008), that income does not predict giving status. The present data also suggested that there was a significant relationship between education support mechanisms, for individuals who had received support through loans, scholarships, and parents, on giving at the *University I* context and confirmed the findings made by Dugan et al. (2000).

Determining Factors of Giving

It is evident from this study that donors for *University I* were highly influenced by personal internal motivations such as: (i) personal reasoning, which includes, the desire to donate to a 'good' cause, to satisfy a need, or when something is desired, (ii) social responsibility, such as supporting the wellbeing of University and students' needs, and (ii) public relation purposes which are closely related to their memories and positive disposition to a particular university, such as an emotional connection and sense of loyalty to the University. The data fits the findings found by Bustamy et al. (2002) where social responsibility is an important reason influencing

individuals to give. Similarly, *University I* staff donors confirmed the findings from Bustamy et al., indicating that Malaysians give readily to those known to them. Likewise, at *University II*, donors chose to give to the University because of personal reasons, such as to provide scholarships, to support a cause or project, having an emotional connection with the University and sense of loyalty to the University. This findings agreed with the data suggested by Oglesby (1991) where experience and relationships with the institutions have an impact on the decision to support the university. Donors from both case study universities are more likely to give because of motives related to their beliefs in a particular cause, the intrinsic joy of giving, liking to be asked, altruism, sympathy, pride, obligation, nostalgia, and commemoration, familial, and these reasons fit well with findings from earlier research (Mount, 1996).

From the *Giving Australia* report (2005), it appears that only 19 per cent of the respondents are aware of the Government's new tax incentives but only 7 per cent of those respondents indicated that the new changes had impacted on their giving decisions. Perhaps, the low awareness on the gift tax deduction incentives may have impacted on the reasons for the support for *University II*. This fits with the findings from the study where tax incentives appear to have no significant impact on the decisions of the individuals at *University II*. Likewise, at *University I*, it is very unlikely that tax incentives will promote giving among the donors and non-donors. In this regard, this data, therefore, disagreed with some earlier findings (Chua, 1999; Clotfelter, 1985; Haggberg, 1992), where tax advantages have an impact on the giving decisions. The findings, however, also suggested that government policies on philanthropy and matching gift mechanisms have an impact on individual's giving decisions at *University I* but not at *University II*. Hence, *University I* respondents demonstrated that their giving decisions were influenced by psychological rewards which were motivated by material incentives (Bekkers, 2010). These findings are consistent with Meier's (2007) data where matching mechanisms were found to increase contributions to public good.

Organisational identity namely, (i) the university's ranking, (ii) the university's research achievements, and (iii) the university's corporate values were central to the decision of individuals at *University I* but not at *University II*. The data suggested that the universities recognise that the wider community are beginning to have an interest in the activities and accomplishments of the universities and how universities rank against each other (Shin, Toutkoushian, & Teichler, 2011). In this regard, the perceived role of the donation in relation to an improved ranking and reputational outcome was more important to individuals at *University I* than *University II*. It is important therefore for the universities to promote their successes in order to attract this form of public contribution. In today's contexts, the universities need to establish long-term relationships with their donors in order to preserve and maintain donors' loyalty and participation and to sustain donations (Gamble, Stone, Woocock, & Foss, 1999). These data fit with previous studies where it was shown that donors are inclined to give if the university's values match the donor's personal interest

and it adds to the institution's reputation (Lindahl, 2010). At *University II*, however, donors showed high level of satisfaction with: (i) the University's fundraisers, (ii) the University's Brand, and (ii) the University's Foundation. The data suggest that, for the universities to retain their existing donors and to attract future donors, it is important for them to lift their reputation and performance (Marlin, Ritchie, & Geiger, 2009). These factors are appealing and attractive to donors and more likely, in the future, to stimulate the donor's desire to give. It is evident that the university's performance and reputation is an important giving factor of giving; it may be as simple as academic and student success breeds philanthropic success.

Tradition and religious culture played an important role in the practices of giving among the participants at *University I* and this data fits the findings from previous studies (Bustamy et al., 2002; Domingo, 2010). The findings indicated that the Muslims donors at *University I* are more likely to give through *zakat*. Similarly, other donors indicated their giving decisions are influenced by their beliefs and cultural values. These data confirm the findings found by Bustamy et al., where individuals' religious beliefs is an important reason for giving and the religious facet in Malaysia plays a significant role in the socio-cultural context (Cheah, 2002). The findings suggested that giving cultures appear to be significantly influencing both Australian and Malaysian donors in supporting higher education and every society has their own philanthropic tradition (Robert & Michael, 2008, p. 20).

Limitations of the Study

The study has several limitations. First, the study focused only on two state universities in two different countries; hence, this limits its applicability to other state universities in the case study countries and not to other parts of the world. Second, the samples were assumed to be representatives of the population. The open survey data collection method resulted in a greater number of non-donor participants than donors. Third, the study focused on comparisons between two sample groups; donors and prospective donors on factors influencing their giving decisions to the case study universities, therefore, the findings may not provide conclusive information related to donors' perspective on the reasons of giving to the state universities.

CONCLUSION

Different cultures and different nations have their own philanthropic traditions, which form the foundation of benevolence in a society. Race, religion, custom and tradition seem to play a major role in influencing individual's giving behaviours in Malaysia, and these broad background factors drive a giving culture. In the Australian context, however, the perceptions of philanthropy and contributing to the University appear to have produced a culture at present that does not promote philanthropic giving to higher education. External factors, namely (i) institution's profile, such as the University's reputation and achievements, and (ii) government's

role in encouraging the culture of giving to higher education institutions, such as, tax incentives, have a significant role in driving philanthropic support in both case study contexts. As individuals behave to reinforce personal habits, and extend their social network; understanding donors' giving behaviour will assist the university's fundraisers to develop and implement an effective fund raising programs.

The challenge facing these case study universities' leaders and fund raising administrators is to ensure that the donors' needs are satisfied. Retaining and sustaining existing donors and at the same time promoting the university to prospective donors is vital in ensuring effective returns for the time and financial resources expended. Fund raising efforts can be more successful when the universities understand the motives behind their donors' charitable behaviour. The factors reported in this study may provide a basis for future research on more complex linkages between donors' motives of giving and organisational identity. Moreover, issues of organisational identity are more likely to pose a challenge to the universities in attracting support from the philanthropists. More research is needed to explore the nature of 'benevolence' and donating within different cultural contexts. The differences found were broad rather than specific and relate to the individuals' perceptions on the identified determinant factors of giving. While the findings of this study are not conclusive in revealing the factors influencing individuals giving to the state universities, these would certainly contribute in assisting the universities to craft a philanthropy 'model' that will have the most impact on the universities prospective donors rather than to implement an approach from 'outside' their milieu.

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PREPARING TASMANIAN ENGLISH TEACHERS FOR CURRICULUM IMPLEMENTATION

Australian school curricula are currently being reformed with the nation-wide introduction of the *Australian Curriculum*, designed to bring national subject content and assessment standard conformity through the detailing of the “core knowledge, understanding, skills and general capabilities [that are deemed] important for all Australian students” (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2008). The reform and implementation of any curriculum require well-structured planning, and at the school level, curriculum implementation requires the input of teachers – the frontline stakeholders.

Research suggests that the implementation of a new curriculum requires concentrated support to ensure that teachers are able to work and progress through professional learning effectively (Australian Curriculum Coalition, 2010, Mulford, 2008). This chapter is presented in two parts: a discussion about the incoming *Australian Curriculum: English*, and an outline of a proposed qualitative case study that will examine English teachers’ perceptions of the implementation of the *Australian Curriculum: English* in Tasmania.

WHAT IS MEANT BY ‘SCHOOL CURRICULUM’?

The definition of curriculum is constantly changing. A school curriculum can be described as a set of learning outcomes for school subjects, but also as a description of and rationale for the skills, content knowledge and assessment standards of achievement for each of these learning outcomes (ACARA, 2008; Kridel, 2010; Squires, 2008). A curriculum is cited as a course of study which guides the direction of classroom instruction; a set of objectives with methods to achieve them (Hirst, 1975; Kliebard, 1986). Therefore, elements of the curriculum need to be sequential, clear, effective and achievable for both students and teachers (Squires, 2005). Although a curriculum does not prescribe pedagogy, it is important that teachers understand how to teach the content, what the required standards are, and why the outcomes are important. Darling-Hammond (2010) notes,

In addition to standards of learning for students, which focus the system’s efforts on meaningful goals, ...[curriculum] will require standards of practice

that can guide professional training, development, teaching, and management at the classroom, school, and system levels, and opportunity to learn standards that ensure appropriate resources to achieve the desired outcomes. (p. 103)

Darling-Hammond argues that, in order to comply with curriculum guidelines and to facilitate the essential skills that students require to achieve the set standards, the teacher must be knowledgeable about the content and language within the curriculum document. Moreover, the curriculum document must be clear and understood by teachers in order to be delivered effectively. Darling-Hammond posits further that Australian curriculum reform, like other international curriculum reform, needs to be supported by effective and collaborative professional development amongst teachers. Mulford (2008) and Darling-Hammond (2011) suggest that this is done by incorporating policy strategies that encourage building strong professional standards and support structures such as teacher professional development, briefings about and evaluation of classroom activities; and through the empowerment of teacher learning for successful curriculum implementation via collegial collaboration. In the context of the current discussion, it is essential that educators are provided with clear and explicit information about the new *Australian Curriculum* in order for them to contribute meaningfully to its implementation.

Recent literature iterates the need for teachers to be heard during curriculum reform (Chaudary & Imran, 2012; Dixie, 2011; Gardner & Williamson, 2004; Noack, 2011). In the Australian context, Masters (2010) notes that “the implementation of the new curriculum will require teachers with expert knowledge about effective teaching practices and high levels of skill in interpreting the new curriculum for particular groups of students”, and that the *Australian Curriculum* “will enhance the quality of teaching and learning in our schools to the extent that it is accompanied by systematic efforts to identify and promote highly effective teaching practices” (p. 11). This tells us that teachers should be included and listened to (Gardner & Williamson, 2004) in order to understand what kinds of supports teachers need during the implementation of the *Australian Curriculum*, to ensure they work successfully under the new requirements. The focus of this nascent study is English teachers’ perceptions of the implementation of the *Australian Curriculum: English*.

THE AUSTRALIAN CURRICULUM: ENGLISH

ACARA released Version Three of *The Shape of the Australian Curriculum* in October, 2011. Version 3 outlines the Foundation to Year 10 curriculum for English. The curriculum is to:

Provide a clear, shared understanding of what young people should be taught and the quality of learning expected of them, regardless of their circumstances, the type of school that they attend or the location of their school. (ACARA, 2011, p. 5)

Furthermore, ACARA identifies teachers as key stakeholders in education processes:

The primary audience for the Australian Curriculum is teachers. The curriculum is concise and expressed in plain language while preserving a complexity appropriate for professional practitioners. Consistency in terms of language and broad structure supports teachers in planning within and across learning areas (ACARA, 2011, p. 11).

Here, ACARA asserts that the *Australian Curriculum* documents will be easy to follow with language that teachers will be able to easily understand, plan, prepare and work with. This quotation also suggests that teachers will be able to collaborate more effectively since the language is considered to be plain. However, there is a limited amount of time for teachers to develop shared understanding of the new 'plain' terminology of the *Australian Curriculum*, particularly given the extent of the changes to terminology from that used in previous curriculum documents. The revised terminology is exemplified in the Foundation to Year 10 English curriculum glossary. The use of terms and phrases associated with the language strand of the new curriculum indicates a distinct shift from the previously-used methods and metalanguage of traditional grammar methods to those of functional grammar. Consequently, in order to facilitate a similar shift in teachers' language practices, teachers will be required to undergo targeted subject consultation and professional development. Teachers have professional obligations that must be addressed, chiefly where assessment requires clear alignment with the curriculum learning outcomes.

The Foundation to Year 10 curriculum is available online for teachers as an access point for professional development that also "facilitates ongoing monitoring and review as well as providing the opportunity to update the curriculum in a well-managed and effectively communicated manner" (ACARA, 2011, p. 25). According to ACARA (2011), the curriculum documents and other sources of professional development will enable teachers, nationwide, to contribute to a collective Australian vision in which the pursuit of common goals should result in a "substantial reduction in the duplication of time, effort and resources" (ACARA, 2011, p. 7).

Currently (in 2011), ACARA's draft of the national *Australian Curriculum: English*, is undergoing a review process by an English Senior Secondary Advisory Group to validate the use of and to prepare for the implementation of the Foundation to Year 10 *Australian Curriculum: English*. Secondary English teachers, tertiary institutions and advisory panels of English literacy specialists have been invited to contribute to the review. Tasmania is barely represented on the advisory panel; thus, this present research is an opportunity to have the Tasmanian Secondary school perspective heard.

The Foundation to Year 10 English Curriculum was due to be fully implemented in 2012, and the senior secondary Year 11 and 12 English Curriculum is aimed to be implemented from 2014. To meet this timeline, ideally, professional development

required for quality implementation and education standards should have already commenced. Similarly, support structures should already be in place to continue the implementation of the *Australian Curriculum*, and to encourage reform efficacy which will best support the education frontline of teachers. Various professional development opportunities for curriculum reform efficacy have commenced in the form of online access to the Australian Curriculum and Assessment Reporting Authority (ACARA) website, an online subject unit and assessment support platform, *Scootle* (www.scootle.edu.au/ec/p/home); local professional (teacher) dialogue, professional and published forums, and nationwide conferences. These forms of professional development are beneficial; however, this professional development is highly organised by superordinate stakeholders as described by Harris and Marsh (2005).

The control of reform by superordinate stakeholders such as ACARA and school leadership alludes to a lack or exclusion of teacher input. Gardner and Williamson (2004) note teacher dissatisfaction during the bombardment of education reform, and that those teachers felt that there were “few or no opportunities to offer input into decision-making” to voice their opinion about the implementation process (p. 11). This is further backed by Print (1993) who posits that a lack of professional development opportunities or schemes, particularly at the local level, do not encourage or empower teachers to expand or extend their professional knowledge (Handal, 2004; O’Brien & Down, 2002). Therefore, this qualitative case study research into teacher perceptions of the *Australian Curriculum: English*, will assist teachers and school-level or local stakeholders in describing what supports and professional development teachers require in order to work under the new curriculum. Carter (1995) asserts that “a consideration of alternative futures in education requires informed public debate by a wide community of interest within a democratic framework that is truly participatory” (p. 33). This suggests that in order to clarify curriculum reform processes, teachers must be consulted about the *Australian Curriculum* and their perceptions and understanding of it.

The perceptions of curriculum reform for secondary school English teachers is an area that will be examined in this study in order to identify the possible tensions associated with the shift from the Tasmanian English Curriculum to the *Australian Curriculum*. It is important to note teacher perceptions of curriculum reform in order to present suggestions of how to manage their workloads, what the teachers believe will best support them in their teaching roles, and to give value to the teacher voice under changing conditions (Gardner & Williamson, 2004). It has been noted that a lack of support and information for teachers during the process of curriculum change can result in increased workload, stress, and professional incoherence (Gardner & Williamson, 2004; Watt, 2006), resulting in reduced efficacy.

Efficacy for teachers is the ability to maintain effective connections between professional learning and classroom teaching. Bandura (1997) describes perceived self-efficacy as a personalised domain of belief and judgement of one’s capabilities.

For some teachers, a high sense of self-efficacy comes from mastery or experience of a subject; or in this case, curriculum. Disruption or change can therefore affect this sense of self-efficacy. Gardner and Williamson (2004) note that teachers are emotionally attached to their work, which affects their ability to “influenc[e] and engag[e] with change; disjointed change that is not understood and embraced by teachers typically is problematic” (p. 14). Further, change such as curriculum reform destabilises teachers’ professional standing and focus which causes or increases dissatisfaction with their role (Gardner & Williamson, 2004). This suggests that teachers require specific or tailored support and professional development to ensure or improve teacher satisfaction and learning when dealing with reform. Part of supporting teacher self-efficacy is to encourage the up-skilling of pedagogical content knowledge.

As part of this study, teachers’ professional knowledge and the implementation processes of the Secondary *Australian Curriculum: English* will be explored. This will be done through an analysis of Secondary English teachers’ interpretations and responses to pedagogical content knowledge (Shulman, 1987) demands of the incoming *Australian Curriculum: English*. Pedagogical content knowledge is “that special amalgam of content and pedagogy that is uniquely the province of teachers, their own special form of professional understanding” (Shulman, 1987, p. 8). This research will provide an opportunity for teachers to develop greater pedagogical understanding and informed professional development through the prompting of curriculum awareness and discussion. This is an important facet of this study, as increased pedagogical content knowledge simultaneously improves teacher confidence, efficacy and perceptions of change.

The aims of this qualitative study are to examine Tasmanian Secondary school English teacher perceptions of and engagement with the Secondary English strand of the *Australian Curriculum* that is currently being implemented; and to identify where support and professional development for Secondary school English teachers is needed for curriculum implementation. This will enhance understanding of this current watershed period in the history of English teaching in Tasmania.

Teaching is a collaborative profession where resources and knowledge are shared in order to gain the best possible outcomes for students and teachers. In a collaborative effort, efficacy can be achieved and shared, learning and understanding can occur which can be viewed as a support system – much like the moderation meetings and inter-disciplinary projects seen in the Tasmanian and Essential Learnings curriculum (Department of Education, Tasmania, 2009). Therefore, like the outgoing Essential Learnings curriculum (Department of Education, Tasmania, 2005), educators must continue to approach education holistically. The Australian Curriculum is,

... guided by the Melbourne Declaration on Educational Goals for Young Australians, which was adopted by the Ministerial Council in December 2008. The Melbourne Declaration emphasises the importance of knowledge, skills

and understanding of learning areas, general capabilities and cross-curriculum priorities as the basis for a curriculum designed to support 21st century learning (ACARA, 2011, p. 4).

In short, the ACARA initiative suggests to teachers that they still need to work together to practice trans-disciplinary teaching whilst maintaining and building on specific subject skills.

LANGUAGE, LITERATURE AND LITERACY

The *Australian Curriculum: English* identifies three key strands of English, namely, Language, Literature and Literacy; whilst the core strands of the Tasmanian English Curriculum are Reading, Writing, Speaking and Listening. One of the major challenges for teachers is to understand the shift in the conceptualisation and the design of the three new English strands of the *Australian Curriculum*.

The Language strand is “about the English Language: a coherent, dynamic, and evolving body of knowledge about the English language and how it works” (ACARA, 2009, p. 6). Here, teachers will assist students to understand the structure and conventions of English language use through different modes of communication, including oral, visual and written texts. Key skills to be developed in this strand include word knowledge, spelling and grammar efficacy. The Literature strand focuses on “understanding, appreciating, responding to, analysing and creating literature: an enjoyment in, and informed appreciation of how English language can convey information and emotion, create imaginative worlds and aesthetic and other significant experiences” (ACARA, 2009, p. 8). In this strand, teachers will be able to engage students with creative tasks and develop students’ critical literacy skills. The Literacy strand comprises a “repertoire of English usage: the ability to understand and produce the English language accurately, fluently, creatively, critically, confidently, and effectively in a range of modes, digital and print settings, in texts designed for a range of purposes and audiences” (ACARA, 2009, p. 6). This strand focuses on language variation and change, bringing attention to the different ways that texts are constructed, depending on their social and historical contexts, their purposes and their intended audiences.

These three strands are similar to the Tasmanian curriculum where basic literacy skills are reinforced and recreated through a wide variety of texts and activities; however, the *Australian Curriculum: English* has a greater focus on the grammatical and syntactic aspects of language use.

THE PROPOSED STUDY – INVESTIGATING TEACHER CONCERNS AND PD FOR A NEW CURRICULUM

Teachers are at the frontline of education reform. They assume the responsibility of implementing curriculum into the classroom where “[t]he success of an

implementation appears to hinge upon the capacity of teachers to cope with the changes expected of them” (Hackett, 2007, p. 3). Curriculum reform fatigue continues to plague the Australian school system (Carlopio, 1998). Gardner and Williamson (2011) state that “[i]t is unsurprising that teachers report feeling change-fatigued and disengaged from burgeoning change initiatives. The time is ripe for investigating possibilities that have the potential to ameliorate the effects of external policy turbulence” (p. 2). This research aims to provide an outlet for teachers to voice their perceptions of the implementation of the *Australian Curriculum: English*, and to provide suggestions for support and professional development during reform processes. By gathering teacher perceptions on organisational characteristics of schools and teacher needs during curriculum reform, there will be information to present to principals that will reinforce supportive structures and promote positive teacher perceptions about curriculum reform.

Recommendations such as those made by Gardner & Williamson (2004) that there should be increased teacher input surrounding curriculum implementation, show that a gap has been identified in understanding how best to provide support and professional development for Tasmanian teachers when implementing a new curriculum. Mulford and Edmonds (2009) further suggest that more research into how to support teachers during curriculum change is required, since teachers “are professional people” and need to be treated as such, including more opportunities and “quality time for professional learning” (pp. 13-14). In order to gain insight into this, the current study aims to examine Tasmanian Secondary school English teacher perceptions of and engagement with the Secondary English strand of the *Australian Curriculum* that is currently being implemented; and to identify where support and professional development for Secondary school English teachers is needed for curriculum implementation. This project will also observe how information is disseminated and re-constructed from the superordinate to the subordinate or school and teaching levels.

The area of curriculum innovation and teacher content knowledge is under-researched nationally and a scan of the literature to date shows no studies relating to Tasmanian teachers. Previous curriculum reform such as the Essential Learnings, had left a bitter experience in Tasmanian teachers’ memories, where “ram raid political agenda[s]” of reform were not viewed positively (Mulford & Edmunds, 2009, p. 4). Further, it should be noted that only three Tasmanian representatives were included on the twenty-six member ACARA Curriculum Advisory Panel for English (ACARA, 2009), highlighting the need for Tasmanian teacher perceptions of the *Australian Curriculum: English* to be recorded. This study will involve qualitative data gathering methods and require the development of innovative data reporting instruments such as graphs and scales. The findings will be of use: to administrators at the system/school level in the planning of professional development; to school level administrators as they will gain insights into how to maximise professional learning resources; and to teachers as they plan their own professional learning experiences.

METHODOLOGICAL APPROACH

The methodological approach that has been adopted for this qualitative case study of a purposive sample (Burns, 2000) of English teachers in a bounded system of Tasmanian secondary schools underpinned by a post-structural framework. Inductive reasoning will be employed that will consider all possible explanations for the ensuing discourse analysis (Burns, 2000; Charmaz, 2006; Creswell, 2012; O'Reilly, 2005). This approach is connected to qualitative constructivist grounded theory methodology (Charmaz, 2006). Grounded theorists “study empirical events and experiences and pursue [...] hunches and potential analytic ideas about them” (Charmaz, 2006, p. 3), which explains that grounded theory is constructed from data and observations are made from them. It suggests an association with a symbolic interactionist approach (Robrecht, 1995; Blumer, 1969) to the study of human behaviour – an empirical approach that is used in grounded theory.

Constructivist grounded theory produces ideas through thematic analysis from the collected data rather than preconceived or quantitative measures of extant theoretical production (Burns, 2000; Charmaz, 2006). It is a “systematic, qualitative procedure used to generate a theory that explains, at a broad conceptual level, a process, an action, or interaction about a substantive topic” (Creswell, 2012, p. 423). Constructivist grounded theory is a positive and flexible, or dynamic approach to research which enables the researcher to systematically collect data and identify categories that form a theory which attempts to explain the observations made. Constructivist grounded theory has been used to explain the actions of people in education settings and the interactions and support of people in institutions (Creswell & Brown, 1992). Constructivist grounded theory allows explanation of observation or events through additional data collection or analysis. This is emancipatory for its ability to go beyond, direct and improve upon the phases of a study, transforming the way in which the subject is regarded through reflection (Mezirow, 1990; Pearce, 2002). This approach assists in the interpretation of the effect of implementation of the *Australian Curriculum: English* for secondary English teachers by positioning the researcher as an observer of individual teacher participants in the larger group of the English teaching staff at a school. Further, constructivist grounded theory is an empowering methodology that proactively examines research data allowing the researcher to create meaning from within a bounded ethnographic study such as a school. This study will take a grounded theory approach in the collection and critical discourse analysis of data. Constructivist grounded theory is an ethnographic approach to research, and a predecessor of Critical Discourse Analysis (Gee, 2004).

Research into curriculum implementation needs to be conducted within a critical theoretical paradigm that acknowledges and critiques the political, social and cultural influences that inform teachers' work. Critical Discourse Analysis requires the researcher to: identify an issue of social concern; identify if the problem is in need of address; identify obstacles to the problem being examined; find ways to

overcome these obstacles; and to reflect critically on the analysis of the findings (Fairclough, 2001). Critical Discourse Analysis will be used in this project to provide an analytical framework from which meaning can be made as a system of representation (Gee, 2011). Gee notes that all discourse analysis needs to be critical since language itself is political. This offers deeper explanation of a social or political issue that has been identified by a researcher, such as the implementation of a new curriculum. Critical Discourse Analysis will be applied to the categories constructed as a result of the inductive constructivist grounded theory process. This will enable rigorous deductive analysis of significant connections and understandings between the various data sources (Charmaz, 2006).

Procedure

As this research project is a nascent study, the research aims will be discussed in light of Harris and Marsh’s Authority Model (2005), which will inform the research to come. Harris and Marsh’s Authority Model explains that, typically an authoritative top-down model (see Figure 1) is used to facilitate reform in schools. Implementation processes include phases of knowledge, persuasion, decision, communication and action. The model explains that information or reform is collectively filtered from superordinate stakeholders such as the Department of

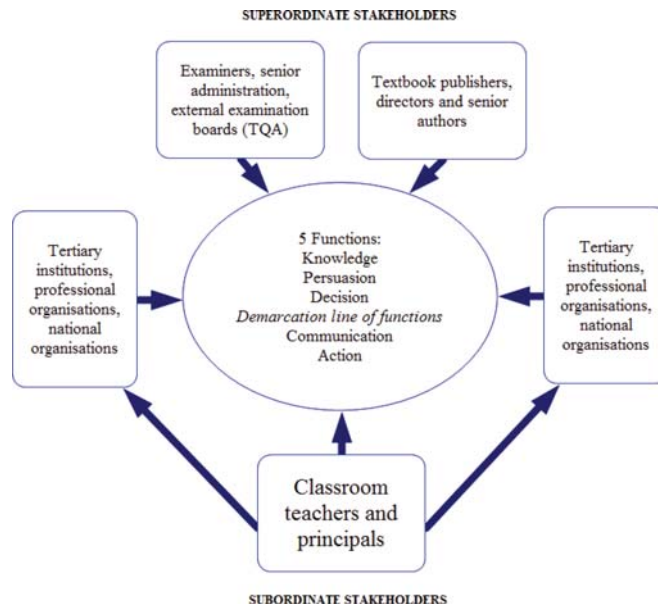


Figure 1. Superordinate and subordinate stakeholder function over time (Reproduced from Harris & Marsh, 2005).

Education, Tasmania down to the subordinate stakeholders; that is, the principals and teachers – the frontline. Throughout the project, anonymous teacher responses will be recorded and analysed.

In the first phase, which is Knowledge, information for reform is relayed to the education departments, from whom the information is filtered and passed on via school directors or leadership then to faculty heads of staff. This information is then given to teachers in the form of meetings or written communications such as emails, staff bulletins or publicly disseminated extant documents.

The second phase, Persuasion, is required to initiate broader discussion between official authority bodies such as ACARA and expert English literacy theorists. Schools are contacted by way of asking for professional opinion, namely in this case via internet consultation and feedback. For this case study, the participating schools will assist in creating a document information trail, illustrating how information was disseminated and how school or teacher participation was encouraged during the current curriculum reform.

The third phase, Decision Making, sees the idea or curriculum begin to form as an official movement through discussion at parliamentary level where it is voted on and recognised as a task that must be thoroughly examined and debated. However, information is still screened at this stage of refinement. This project will look at teacher involvement at the decision making phase in terms of formal recognition of the teacher voice.

Communication in the Authority Model sees filtered, nominal information surrounding the incoming curriculum, or the knowledge, gradually passed down from official or superordinate bodies through to the teachers. At the school level and for this project, Year 7-10 *Australian Curriculum: English* documents will be important to gather in order to record and examine the kind of information that teachers are receiving, and their reaction to it, which leads to the final phase of Action.

The Action phase is where the types of professional development and teachers' responses to professional development will be looked at in order to identify teachers' perceptions, concerns and questions that will enable discussion and suggestions for future teacher professional development in education and curriculum reform.

Data Gathering

Participants for this case study research will involve a purposive sample (Burns, 2000; Neuman, 2006) 10-15 male and female qualified practising Secondary School English subject teachers in Tasmanian Secondary Schools. This sample is most "relevant to the project" (Sarantakos, 2005, p. 164) because they are practising teachers in the area being studied. The researcher is employed full-time in the education system, thus selection of schools as research sites affords easier access (Burns, 2000).

As the aim is to examine teacher perceptions of and engagement with the Secondary *Australian Curriculum: English*, and to identify where support and professional development for Secondary school English teachers is needed for curriculum implementation, an Opportunity and Purposive sample (Burns, 2000; Miles & Huberman, 1994; Sarantakos, 2005) will be drawn. The intention is not to generalise to other contexts, hence a small sample as described is appropriate. This exploration will later assist teachers to understand the processes of curriculum reform and what to plan for in terms of professional development. Participants will be asked to complete a questionnaire, and participate in audio-recorded interviews concerning the Secondary English curriculum. These discussions will ascertain teachers' pedagogical content knowledge in relation to, and their perceptions of the implementation of the *Australian Curriculum: English*.

Collection and analysis of publicly disseminated extant texts within the school site will enable the researcher to gauge the type of information being distributed to English teachers, and how these teachers perceive the implementation of the *Australian Curriculum: English*. As the documents are not affected nor influenced by the researcher, the justification and validity of this data source is strong. Document analysis as data allows the researcher to "corroborate evidence from other sources" (Burns, 2000, p. 467). Pre-written texts assist in the selection and creation of a line of inquiry including the types of questions that could be asked in surveys, questionnaires or interviews. For example if recommendations or mandated requirements are made by a curriculum authority for a school to carry out, then questions to follow up on the success of the recommendations can be asked. This type of data analysis serves as a pivotal point in a chain of data sources where a line of interest within a document can be followed up with a surveyed question, or as a point of discussion in an individual interview.

Questionnaires provide a base of information that is documented by a respondent. The use of a questionnaire offers fewer errors compared to interviews, as there is controlled delivery and each participant has the same set of questions. Other benefits include reduced anxiety for the interviewee with more confidentiality due to lack of interviewer's presence, more opportunity to contact a larger number of respondents, and no requirement to set up a contact time to complete the set questions (Burns, 2000).

Interviews are one of the richest, most useful and important data sources about the people and or places from which they are taken. This data source provides detail, insight and identification of other possible data source leads. The richest interviews are usually open-ended, semi-structured or use facilitative questions (Burns, 2000). Facilitative questions produce scope for emergent themes for discourse analysis by eliciting a dialogue about a topic or issue that the interviewee would otherwise not expand on in a questionnaire. The purpose of an interview in a case study is to validate responses that have been recorded completely and with accuracy (Burns, 2000). Benefits of the use of an interview as data include: a higher response rate

from interviewees, good for use in smaller sample sizes such as a teaching cohort, the opportunity to have questions clarified in person which contributes to the higher response rate, and a record of extensive data including the opportunity to record body language and spoken delivery nuances (Charmaz, 2006).

CONCLUSION

Adaptation and flexibility are important teacher qualities. It has been noted however, that so called change fatigue (Edwards, 2005), particularly in Tasmanian schools, has not yet been remedied (Tasmanian Association for the Teaching of English, 2010). Recurrent waves of curriculum reform have battered Tasmanian education institutions throughout its short but rich history (Watt, 1997, 2006). These waves of reform have resulted in teachers engaging in short-term planning in order to meet strict accountability measures and to ensure that the curriculum of the time is being followed. Professional development resources are being created as an ad hoc response to these ongoing changes (Perillo & Mulcahy, 2009).

This research will be of interest to education stakeholders including teacher educators, school authorities and system-level policy developers. Through identification of interstices in professional development and support systems during the *Australian Curriculum* implementation, this project will highlight where research should be extended and which issues should be addressed for greater equity and empowerment for teachers. As Marsh asserts, "If reform of any kind is to succeed, teachers must believe that they will have a meaningful voice in decisions and will not become the lone scapegoats of a failure to reach goals" (cited in Hargreaves, Earl, Moore, & Manning, 2001, p. 7).

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JANE BAKER

MUSICAL ENGAGEMENT AND WELLBEING IN YOUNG GARAGE BANDS

Music has been described as a constant, inseparable element of life in a range of cultural contexts (Bayliss, Lierse, & Ludowyke, 2009; Campbell, 2005, 2007; Robinson, 2006). Cavicchi (2002), for example, stated that,

Music is finely interwoven into the text of our lives, a means of shaping perception and participation...not necessarily the source of marked transcendent experience but a resource for the unmarked, regular, hard work of getting through each day. (p. 7)

A growing body of research has likewise demonstrated the potential of musical practices to promote physical, emotional and spiritual wellbeing (Mills & Brown, 2004; Nzewi, 2007; Watson & Barker, 2006). More specifically, such findings have described the ways in which people utilise musical practices for inspiration and intellectual pleasure, for comfort when mourning, as a form of escape, and as a source of mental diversion and stress relief (Adorno, 2003; Costantoura, 2001; Cleveland & Shifferd, 2008; Gregory, 1997).

Similarly, music use has been cited as a powerful medium for the management of moods and emotions. Research has indicated, for example, that musical practices provide people with a means to develop a greater awareness and understanding of their emotional and embodied states (DeNora, 2003; Hughes, 2008; Vestad, 2010). Likewise, musical engagement has been found to offer a means through which people can enhance or regulate their emotional, embodied and psychological states and capacities (Batt-Rawden & DeNora, 2005; DeNora, 2003; MacDonald, 2009).

Music use has also been described as a means to support the negotiation of relationships with others. Research has indicated, for example, that musical practices provide a means to: foster a sense of shared human dignity, develop a sense of shared cultural identities, provide a channel of hope for marginalised groups and a means to promote social harmony, acceptance of difference, community spirit and transformation, to highlight inequalities, and prompt social action, social inclusion, neighbourhood renewal and cultural citizenship (Arts Council England, 2005; Mills & Brown, 2004; Smythe & Stevenson, 2003; Stevenson, 2007).

Research has also outlined the potential role of music in identity work. Studies have found, for example, that musical practices offer a powerful means through which to: explore and develop personal identities, articulate a particular self-image

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or personality, and to aid impression management, communicate self, emotions, thoughts and knowledge (Byers, 2010; DeNora, 2003; Hallam, 2006; Harrison, 2008, 2009; Hughes, 2008). Investigations have also highlighted the potential for music to: build self-esteem, through the development of a sense of achievement, ownership and pride; challenge negative self-conceptions and foster positive reconceptualisations of self; assist personal transformation; increase a sense of self-efficacy, self-determination and resilience; and for empowerment (Casson, 2006; Kennedy, 2002; Saubern, 2009, 2010; Silber, 2005; Williams, 2008).

Research has also indicated that the quality of relationships developed between music and everyday life is even more pronounced for Western youth. Stalhammar (2006), for example, observed that young people were the largest consumers of music, which was one of their major leisure interests. He noted that adolescents engaged in a plethora of musical activities beyond actually playing music, through videos; concerts; the Internet; graffiti; dance; skateboarding; and adopting various clothing styles. Vestad (2010) likewise observed that recorded music had become so widely accessible to young (Norwegian) children, that it shaped their tastes, attitudes and shared cultures, while Hargreaves, Marshall and North (2003) found that pop music listening had become “central to teen life” (p. 154). Psychologist Lloyd (2002, p. 73) spoke of this situation in terms of a “zeitgeist” of media and technologies, while music education researcher Campbell (2005, p. 30) described the “surround sound environment” blanketing youth. This echoed her earlier analysis (1998) of the ways in which children are daily immersed in, and filled with music. Kratus (2007, p. 45) similarly reflected that music not only constituted a “soundtrack” to teens’ lives, but also formed the basis of a “potent and deeply personal” connection. Each of these diverse commentaries serves to highlight the centrality of music within young people’s lives.

LEARNING, MUSIC USE AND IDENTITY WORK IN YOUNG GARAGE BANDS

This investigation examined the lived musical experiences of five Tasmanian garage groups from a diverse range of popular music genres, whose members were aged between twelve and eighteen. The primary points of focus within this qualitative project were the ways young musicians used music within their everyday lives, the role that music took within their identity work, and the forms of learning involved in their musical practices. The inquiry gathered data through a combination of interviews, field observations, and researcher reflections, and utilised a narrative case study approach towards analysis. This chapter reports on the outcomes for one of the bands and includes contributions from a family member of one of the band members.

This project began from the premise that everyone’s life is ‘narratable’ or ‘worth telling’ (Frank, 2002). In this context, ‘narrative study’ was viewed as a means to describe and honour multiple lived participant perspectives and identities. The project sought to accomplish such aims through the development of an ethical, ‘resonant’

(Barrett & Stauffer, 2012; Stauffer & Barrett, 2009) framework for research that involved a relational, dialogical approach (Barone, 2006; Foster, 2009; Hickey & Austin, 2008) that utilised multiple data collection opportunities to encompass the complex nature of the experiences of the participants. This project was therefore a descriptive, storytelling study, which rested in what Stake (1995) described as the zone of combined purposes as it aimed to provide rich, contextualised accounts of band members and their stories, which may also provide some points of resonance for other musical and educational situations.

Introducing Local Menace

Local Menace (pseudonym) was a four-piece Year 10 retro metal act featuring drums, bass, guitar and vocals. On the mid-summer day that we first met, Richie, the guitarist wore black denims over his thin, bony frame, a navy singlet, and a checked flannelette shirt, unbuttoned to the waist. His straight, shoulder-length light brown hair was tucked behind his ears. Ahmed, the drummer was tall, muscular and self-assured. He had straight, dark brown shoulder-length hair and thoughtful brown eyes. Today, he had on black denims and a metal t-shirt. Josh, the lead singer was quietly spoken, with long, messed-up light brown hair. He wore tight, black straight legs, studded leather belt, navy singlet, and biker boots, with a long red bandana trailing from his back left pocket. Theo, the tall and very thin bass player wore black denims, navy singlet and a flannelette shirt. His long, straight, dark hair hung loosely about his shoulders as we talked.

Music and General Wellbeing

The band described lives filled with music, and highlighted a range of ways in which they used music as a means to maintain general wellbeing. Members described using music to relax, escape or relieve stress, to have fun, and as a means of becoming energised or “pumped” for physical tasks. The band also said that music could sometimes help people to become more focused, or, alternatively, to prevent boredom. Ahmed, for example, described the constant nature of his daily interactions with music: *I wake up to an alarm, a music track, or a new song we've been doing. Have the radio on while I have a shower. Listen to an MP3 player on the bus on the way to school.... I listen to it in class - we're not allowed.... On the bus home, at home, turn the stereo on, go to bed. It is all day and when I'm not doing that, I'll be singing songs in my head. If that's weird at all? I've got a song in my head all day, every day,* he exclaimed with a laugh, *It's pretty much all I think about.*

Similarly, Theo told me that he *listened to music 24/7, as much as I can. It doesn't bother me what style it is, really, either.... I sort of just can't picture life without it. It'd be a pretty weird life,* he observed. *We just do it [play music] because we love it,* Josh added. *Play that music!*

Music and Emotional Life

Each of these young men described a broad range of emotional responses they had intentionally invoked by listening to or playing music. They all highlighted, for instance, the happiness that music had brought to their lives. They also described using music as an emotional outlet and regulator. Each detailed individual methods of consciously selecting musical recordings to alter or match their current moods. The band members talked about listening to and playing specific pieces to boost their moods, induce calmness when angry or upset, or alternately, to enable a period of emotional venting, energy, or excitement. Similarly, each described songs that had caused them to reflect on their own or others' lives.

Richie, for example, told me that, music *creates a mood and a vibe...it keeps me happy*, adding that he was aware of the emotional power of music, *whenever I listen to music...if I'm really angry, I'll usually put on light acoustic, or soft, quiet stuff.... Mellow.... If I'm in a really good mood, I'll listen to some of my favourite bands, and get fairly pumped. Start singing really loudly*, he admitted with a laugh. *If I'm sad, like, I might listen to blues. They all create a different mood. I've...[even] thought of songs to have played at my wedding.*

Josh likewise explained *some songs...get you all hyped up, give you a bit of will-power...to get going*. Conversely, he noted that music sometimes provided a *calming influence.... It could change your mood, if you listen to it....*

Theo also said, *if I'm angry, I try to keep that going, for some reason.... Listen to real hard metal*. In a surprisingly candid moment, he then went on to describe the pleasure he received from Johnny Cash music *It makes me happy, calms me down*, he said. *It's good. Yeah. I like my Johnny Cash.*

The band's deep, saturated, daily experiences of music echoed the findings of prior research highlighting the potency of this medium within the lives of young people (Campbell, 2000, 2005; Green, 2002, 2008; Hargreaves et al., 2003; Stalhammar, 2006; Vestad, 2010). The young musicians' discussions of intentional music use also demonstrated yet again the potential for such forms of creative arts involvement in the maintenance of multiple aspects of wellbeing, including the regulation of emotional states (Batt-Rawden & DeNora, 2005).

Music and Relationships

The young musicians also described involvement in a complex web of musical communities beyond their immediate families and schools. These experiences within musical communities included taking part in an annual Summer Music School hosted by a Northern Tasmanian senior secondary college, and competing in an annual Rock Challenge for Tasmanian secondary school students. Some of the band members described learning music in a Northern junior orchestra, playing music in churches, various community choirs and university bands, and participation in a local senior secondary Rock Clinic. In addition, the musicians

described involvement in non-formal music-mentoring relationships with peers, friends of the family, older musicians, fellow church members, and private music teachers. The band viewed such webs of relationships as a direct (and positive) consequence of their musical involvement. They detailed the ways in which playing music had expanded or shaped their social networks. They also noted that musical involvement had boosted their confidence levels, creating a flow-on effect within their daily social interactions.

Richie told me, for instance, that music *is important, because I'm getting out there...meeting new people.... I get to jam with people all the time.*

Josh listed some of the musical communities he had been involved in over the years. He summarised his musical pathway through school as *choir* in primary school. *Then, I was in the River Band...grade four [to] six. Percussion. Grade seven, I didn't do much, just drumming. But then the production came along and I started singing.* This show, *an 80s thing*, was an extra-curricular activity open to all interested students. A little earlier, Josh also began playing drums in a music class band, with Richie and Ahmed, *and another couple of guys.... Played outside the canteen a couple of times.*

Theo likewise described some of his early musical relationships. From grade six, he began having informal guitar lessons with friends of the family. Later, he moved on to the bass. *My brother said, "Play this!" I already had good guitar skills...so, handled the bass pretty easily, and liked it.*

Theo explained that his father, who was also a bass player, introduced him to *all the old stuff*. He also talked about the support his family provided the band. *They come to our concerts.... It's pretty cool*, he said, tossing a strand of long black hair out of his eyes.

Each member of the band noted that such relationships had shaped their lives in particular ways. Theo, for example, told me about the effects of his musical interactions at high school. *I used to listen to a lot of punk...Blink 182, Green Day.... Then, I got into metal-metal... [and] just reduced back to the 80s.* He noted that such musicians had pushed him *to care about music....*

Similarly, Josh said that *without music, I think my attitude might have changed.... I can appreciate music more, and listen harder [than non-musicians]....*

Deliberating over such conversations highlighted the complex web of interconnected musical communities within some garage members' lives (Barrett, 2005; Campbell, 1998, 2007; Cope, 1999, 2002; Mans, 2007; Pitts, 2007; Powell, 2004; Westerlund, 2006). This band's descriptions of such musical networks also demonstrated the potential role of musical engagement within the development and maintenance of young people's social wellbeing. The band described their navigation between the influences of a complex interplay of varied communities of musical practice, such as families, friends, other musicians, virtual internet channels of identity construction and learning, and avenues of formal education. Through membership in these multiple and varied communities of musical practice, band members were provided regular opportunities to build upon existing social

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skills, as they daily negotiated their relationships with, and identities in relation to other musicians.

Identities and Music

Every young person in the band said that they would be different without music in their lives. Some of the musicians detailed the ways they felt musical engagement had shaped their identities, thinking, and attitudes. The band described the ways in which their everyday choices regarding dress and personal style had been influenced by the musical cultures they follow. They explained that the group's identities had evolved over time as their musical tastes expanded. They often talked of the band's image in terms of a scripted performance, involving costume. Such expressions of band image were also considered opportunities for the articulation of individual identities.

Similarly, the band described the music they played as another means of self-expression. They provided graphic examples of artists who used music to convey particular political, philosophical, or spiritual messages, and discussed the messages they had promoted through music.

During our second group interview, I asked the band to describe their image. After a lengthy pause, Theo spoke. *Tough*, he intoned with a laugh, in his typically staccato style of communication. *When we play...outside of school gigs, we just sort of put on the leathers*, Richie explained. *Chuck on a flannie*, Theo added. *Cut off sleeves. Tight denim*, Josh noted. *Eighties, early kind of bogan*, Ahmed summarised. *Vintage rock and roll, with a bit more metal. Like the biker image*, Richie went on. *The traditional metal look. I've never really thought of dressing in any other way, after deciding, "I'll dress like that. That looks cool"*, he explained. *All the metal players dress like the metal...style.*

Richie went on to describe the ways in which particular bands had influenced their personal and group identities. Following a detailed history of various Black Sabbath musicians, he said, *we always look up to our idols in music, and...think, "Well, one day, we could possibly be like them"...Joe Satriani...and his band, Black Label Society...Iron Maiden ...we're modelled off that a bit...without those guitarists...I'd definitely be a different guitarist.... I'd think a lot differently. Yeah, I like Motley Crue's look*, Josh similarly admitted. *Some bands I dream of being... their sound's old. I'm in there*, he said with conviction. *I wouldn't wear the high heels, but...it influences us a lot.*

Richie's mother told me that *music means to them, everything...they are just totally devoted to it*. Richie, she thought, *is so passionate about music that he is totally consumed by it*. During another interview, Ahmed likewise described the key role that music took in his life. *Music is what really sets me apart from other people...It's what I am; it's what I do; it's what I think [about]*, he said.

Considering such conversations later, it became evident that the members of his band used and thought about music in a complex blend of ways. Each member

adopted a bricolage of musical styles to form a constantly evolving, embodied and multiple expression of self, in addition to their equally flexible joint expression of band identities (Gall & Breeze, 2007; Giroux, 1998; Ligorio & Pugliese, 2004; Lloyd, 2002). These findings echo in a small way the prior research that describes identity work as an ongoing, fluid and multi-faceted project, which relies upon relational and dialogical processes (Johansen, 2010; Keddie, 2002; Mason, 2003; Wenger, 1998).

Throughout our interviews, the band members also discussed the ways in which they sometimes used music as a means of self-expression. Ahmed, for example, noted that *it's not just enough for the music to be our style and good – it's got to... mean something to us.... I think that was one of the reasons it was created.... Getting a message across. I mean, the whole idea of music is it makes you feel things, it makes you think things.* Richie added, *Rage Against the Machine...[and] punk bands...[are] very political. Saying the government's bad, nuke the president.... A lot of old rap bands, like, Public Enemy, there's a lot of racial comments in there.... It can send out a really strong message.*

When it came to the band's originals, Richie stated that, *we just write about what we think about, really,* although noted that they did not consider themselves to be a “political” band. *Like, one of our latest songs was written about...how people are judging us, because of our age and what style we play. Like, a lot of people laughed at us, because they thought we were young and couldn't do it,* Josh explained. *And our song's all about that – that we can, I guess.*

Later, I had the opportunity to hear a recording of this original. Recollecting Richie's comments about not being a “political” band, I was interested to listen to their sardonic references to the stereotyped image of wild, frightening and uncontrollable teenagers. It was clear that despite outward appearances, these young men were complex, multi-sided individuals, who thought deeply and acted with intention.

FINAL REFLECTIONS

On reflection, it was evident that Local Menace had constructed a sophisticated blend of musical practices relating to the maintenance of wellbeing. Amongst other applications, this included the intentional use of music as a mode of stress relief and relaxation, to regulate moods and emotional states, as a vehicle for the development of complex relationship networks, and to construct and communicate expressions of identity. As on past occasions, I marvelled at the contrast between such findings and the unfortunately common perception that many garage band musical practices involve simply “mucking around.”

Conversations with the band members highlighted the stereotyped nature of some of my initial ideas about young people in garage bands. In many ways, the boys involved in the study were typical of the hundreds of teenage boys I had met before through teaching. Yet, this opportunity to talk with such young men at depth and listen to their stories challenged my existing views about boys of this age and

their capacities for musical practice, self-awareness and analytical thinking. I had not expected to see the level of purpose and complexity concerning music use and learning that they displayed; rather, I had anticipated that the interviews and observations would involve wading through quite a deal of tom-foolery and off-task behaviours. Further, I had expected that such young men would be hesitant to discuss personal thoughts and feelings, and shy away from such conversations.

In contrast to such ideas, it soon became clear that Local Menace had developed a unique, complex and fluid bricolage of musical practices and identities. The band had creatively invented, borrowed, and remastered elements from various musical experiences, which they put to a range of uses within their lives. They also displayed an obvious awareness of and willingness to discuss the interconnections between music, emotions, identity and meaning. They happily described the impact of music on daily life and their intentional adoption of eclectic musical elements as an expression of individuality and an aid to other aspects of wellbeing. Now, nearing the close of this study, I reflect upon the personal lessons that the project involved, and wonder how many other times I failed to recognise the potential power of young people's self-guided musical practices.

While this small qualitative study cannot be used as the basis for large-scale generalisations, it is clear that the personal lessons described above may resonate with educators and education researchers in other contexts. The dedicated, purposeful and strategic approach to musical practice evident within the bands in this study is further evidence that it is important to value the musical knowledge and understandings that young people bring with them to school. From this perspective, the current project could be viewed as an invitation to look at our personal and social worlds in fresh ways, to challenge traditionally held conceptions and to imagine other possible meanings, especially in relation to the ways that we interpret the musical practices of teen garage bands.

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SECTION 2

RESEARCHING TEACHERS' EXPERIENCES

SHARON P. FRASER

INVESTIGATING TEACHERS' EXPERIENCES

It has been said that teaching is one of the only professions that every person has been exposed to at some stage in their life. As everyone has been a student, everyone has an opinion about teachers and teaching, even though most people have not had the experience of being a teacher. We know, however, that teaching is inherently complex and educational researchers try to make sense of teachers' experience(s) and practice(s), but to do so they "must necessarily narrow their scope, focus their view, and formulate a question far less complex than the form in which the world presents itself in practice" (Shulman, 1986, p. 6). The chapters included in this section have been written by five educational researchers who do just that; their research focuses directly upon aspects of teachers' or student-teachers' experiences, or the context within which they work and learn. Each of the chapters are quite different in their focus, the methodology they will or have use(d), how they (intend to) present their findings and the extent to which their voice is evident in the research. As you will note, two of the contributors (Cruickshank, McCarthy) are quite early on in their research, only commencing an exploration of the phenomenon they are interested in through summary literature reviews. One researcher (MacDonald) and her doctoral supervisor (Moss) enhance the normal critical review of the literature through a slight addition; MacDonald contrasts the literature with her own experience of simultaneously maintaining her identity and practice as an artist and a developing teacher. The remaining authors (Kidd, Ngwenya) have completed their research and through reading their contributions we are able to see the importance of their findings for the teaching profession. All contributions are 'educational' (Ball & Forzani, 2007a) in their research goals and approaches, and together their work contributes to our greater understanding of the complex practice of being a teacher.

The researchers' work will contribute to the body of knowledge that teachers have available to them to both improve the quality of their own teaching, and potentially their students' learning, and to solve problems that arise in their classrooms and schools (Mortimore, 2000; Everton, Galton & Pell, 2000). Such research must, therefore, be of good quality and it must be seen to be relevant to practitioners, many of whom will judge its "merits on the basis of whether the findings can be translated into procedures that work in classrooms" (Brown & Sharpe, 2003, p. 460). As educational researchers are interested in influencing practice and contributing positively to teachers' experience, their ideas must "...be accessible to educators and policy-makers, [and they] have to market their knowledge to the education

community as well as the research community” (Brown & Sharpe, p. 461). How to do this well remains a challenge, but as the number of educational research publications increases each year, and there is little or no evidence of improvement in educational attainments (Reeves, McKenney & Herrington, 2010), we must learn to market our knowledge more effectively.

Putnam and Borko (2000) advise us that “as researchers trying to understand what teachers know and how they learn we must be particularly attentive to the support and guidance that we provide” (p. 13); such advice is very pertinent to Cruickshank’s research; the first chapter in this section. His chapter provides us with a critical comparative analysis of the literature pertinent to attracting and retaining male teachers in primary education in Australia. Australian Bureau of Statistics (ABS) data (2010) indicates that the proportion of teaching staff that is male in Australia reduced by 9% between 2000 and 2010, which means that males now represent less than one third of all teaching staff (full time equivalent [FTE]). Of these staff, 32% are employed in primary schools where they represent 19% of primary school teaching staff (FTE), which is a decrease of 11% since 2000. This is indeed a disturbing trend, and one that provides very strong basis for Cruickshank’s research. The author admits, however, that being male himself, and previously a teacher of health and physical education in primary schools, has also prompted his interest in studying this phenomenon.

Cruickshank’s analysis identifies 5 themes which help organise what is known about the experiences of male primary school teachers; such analysis (thematic) enables a better understanding of the complexity of the issues underpinning the decreasing participation of males in the teaching profession. He suggests that we might be reaching a ‘critical mass’ of male teachers in the primary school setting and provides recommendations for addressing this problem that require coherent and collaborative efforts on the part of Government, school leaders and the media. Cruickshank’s work reminds us that schools are themselves ecological systems (Bronfenbrenner, 1979) which may require an ecological approach to solve their dilemmas; approaches that recognise the “interdependence between the individual and subsystems of the ecosystem (e.g., family, community, culture and the physical and social environment)” (Daniel & Green, 2002, para. 13).

Cruickshank’s research is significant also for Faculties of Education delivering teacher education courses, as teacher educators are responsible for preparing their male students for the world of work, inclusive of issues relating to “cultural identity” (Bourdieu, 1991), which are at the heart of the themes that Cruickshank has identified. If we are to assist in increasing the number of male teachers going into the profession, we ourselves need to consider how we might attract (and retain) more males into our teacher-education courses; currently only 18% of our Bachelor of Education (Primary) students are male with our graduate-entry Master of Teaching (Primary) not faring much better (22% male). To me, this research also suggests the need to ensure that the curriculum that our students (male and female) engage with raises their awareness of the issues that they will face when entering the profession

and enables them to develop the capabilities and resilience (Le Cornu, 2009) to deal with them.

As was the case for Cruickshank's research, the MacDonald and Moss chapter exemplifies a not uncommon practice in educational research, that of the researcher, researching a phenomenon of personal interest/experience. Through a critical review of the literature, contrasted skilfully with the researcher's (MacDonald) autoethnographic accounts of her own experience of being an artist-teacher, the authors help us recognise the importance of the first few years of professional teaching practice in achieving a balance between the goals and practices of both artist and teacher.

An interesting aspect of this chapter is the methodology that the researcher has adopted – autoethnography. Autoethnography can be defined as “research, writing, story, and method that connect the autobiographical and personal to the cultural, social and political” (Ellis, 2004, p. xix); it is “part auto or self and part ethno or culture...[and] something different from both of them, greater than its parts” (pp. 31-32). This methodology enables the researcher to communicate their role in the research, and how they relate to the research or phenomenon being studied. What emerges, therefore, is not only an understanding of the researcher's own story (subjective experience), from the perspective of both the researcher (subject) and the reader, but also a greater understanding of the issues being foregrounded through the storytelling. Writing autoethnographically means writing in the first person and writing reflexively; such writing, therefore, “displays the writing process and the writing product as deeply entwined; both are privileged” (Richardson, 2000, p. 930). Educational researchers choosing to research and write in this way need to be aware of the criticism that the methodology attracts, as Roth (2005) summarises “...auto/ethnography could easily lead us into the mires of fuzzy thinking, will-o'-the-wisp inspiration, and self-congratulatory, feel-good accounts of worldly events” (p. 9). The researcher who conducts research autoethnographically must be systematic, rigorous and self-disciplined in their approach and the research ‘outputs’ that they create must make a substantive contribution (to understanding), have aesthetic merit, demonstrate reflexivity, have both an emotional and intellectual impact and be recognisable as an expression of reality (Richardson, 2000).

The third chapter in this section by Robyn McCarthy focuses our attention, amongst other things, upon the ever changing environment that is the teaching profession, specifically the implementation of the new Australian curriculum. Curriculum change is an ongoing phenomenon in educational settings; it is undertaken in a socio-political context (Taylor, 1993), and it will therefore inevitably mirror the goals, values and interests expressed by the dominant voices of society at large. It requires exchanging old ways (of being, thinking and doing) with new ways (Lovat & Smith, 2003) and may result in a division amongst staff – those wanting to retain the old and those whose interests lie in promoting the new. Either way it requires staff to be resilient in the face of quite significant curriculum change and confident in their understandings and abilities to modify their classroom practice. It is

timely, therefore, that this area provides the focus for McCarthy's doctoral research. Her early work presented here, provides us with insight into the ways our understandings/conceptions of creativity have changed over time and how such changes have been reflected in educational contexts.

McCarthy's research will ultimately be a longitudinal exploration of pre-service teachers' experience and will take a narrative inquiry approach to both data generation and analysis. Such an approach aims to "understand phenomena through the meanings that people assign them" (Klein & Myers, 1999, p. 69); researchers focus more on the meaning people make of events/experiences rather than the event or experience itself. Researchers who undertake their research within the framework of narrative inquiry utilise a number of research approaches and methods in their studies but central to their thinking is that "the story is one if not the fundamental unit that accounts for human experience" (Pinnegar & Daynes, 2006, p. 4). They incorporate "experiential starting points which are informed by and intertwined with theoretical literature" (Pinnegar & Daynes, 2006, p. 5); in short it is a methodology that requires some measure of critical literacy, literary and creativity, to ensure that the "manifest intention of the speaker is meant as it is expressed" (Habermas, 1984, p. 99). Narrative inquiry is growing in popularity in qualitative research, and it has been used quite extensively in educational research (Clandinin & Connelly, 2000) and teacher development and preparation (see for example Conle, 1996, 2000); it is also becoming a methodological strength of researchers in the Faculty of Education at the University of Tasmania (UTAS). Emerging researchers must take note, however, of the criticisms that the approach attracts in regards its legitimacy (in regards truth and appropriateness) and embrace such challenges as Conle (2001) suggests, it is important "...that validity claims are made, and should be made, to safeguard the rationality of narrative inquiry in both research and teacher education" (p. 30).

The next chapter by Lynda Kidd, examines the impact of early teaching experiences on the beginning teachers' confidence in teaching mathematics, or their mathematical teacher-efficacy confidence (MTEC). Kidd's research is significant as it provides important data about of the experiences of beginning teachers and the impact of such experiences upon teacher-efficacy, specifically, MTEC. Not only do these data help us to understand how we might better support the transition of student-teacher to beginning-teacher, but they also raise further questions for teacher educators. How do teacher-education courses assist students to maximise their potential for gaining employment and therefore maximise the opportunities for developing teacher-efficacy? How do we prepare students for the likelihood of entry into the teaching profession via fixed term or casual teaching positions rather than through the preferred tenure track route? How do we assist our students to maintain and enhance their level of teacher-efficacy after graduation in the face of uncertain employment prospects?

Kidd also provides readers with an interesting post hoc reflection on the limitations of her research. She identifies concerns about her research and includes suggestions for improvement which highlights the need for educational researchers to be able

to recognise and improve upon research methods and instruments (maintaining a critically reflective stance) to ensure that its 'rigour' and ability to influence practice are maximised. Kidd's reflections also highlight one of the issues that qualitative (and mixed methods) researchers have to grapple with – its dependence on small samples, and therefore the belief that its outcomes are not generalisable (Yin, 1984). The extent to which this is an issue can only be determined on a case-by-case basis, as "problems related to sampling and generalizations may have little relevance to the goals of the study and the reality of the situation" (Meyer, 2000, para. 9). The defence of qualitative research is decades old, but rather than viewing such debate as entirely negative, it has forced qualitative researchers to maintain their critical approach to data generation and analysis and to develop their own concepts (Lincoln & Guba, 1985) for conducting and evaluating research to ensure its 'rigour'. The quantitative research concepts of 'validity (internal and external), reliability and objectivity' have been replaced with 'credibility, transferability, dependability and confirmability' in qualitative research. Each research approach (for example, narrative inquiry, case study, ethnography) has its own attributes or criteria which characterise what is good about it. It is important, therefore, for educational researchers to be aware of the discourse around the 'rigour' of their work and to ensure that the appropriate tools are applied to meet research goals and that findings are presented in ways that are transparent and explicit, so that its quality is there for all to judge.

The final chapter in this section focuses on the impact of teacher time allocation and workload, specifically the allocation of (sufficient and/or uninterrupted) break time whilst at work, upon teacher wellbeing. Research such as Ngwenya's is significant in the light of our current understanding of teacher resilience, wellbeing and teacher burnout, which is resulting in teachers leaving the profession and teacher shortages in some parts of the education system (Pilay, Goddard, & Wilss, 2005). For those of us in teacher education, Ngwenya's findings also challenge us to assist our students to develop their skills and strengths to cope with stresses, problems and challenges; as such resilience has been identified as the key to retaining teachers in the system (Bobek, 2002). How do we teach them how to manage their time and organise their work in the light of the heavy workload that teachers can experience in a normal working week? Are we doing an adequate job in alerting them to the essential nature of health and wellbeing for professional longevity? How can university educational researchers contribute to the solution through working with valued stakeholders and making the outcomes of our research more relevant and accessible to them?

Ngwenya's work also provides us with an example of research that uses data that have been collected in the past (see Gardner & Williamson, 2004) for a particular purpose, to answer questions which were not necessarily part of the original study. Making use of extant data sets in this way, rather than collecting new data, is not uncommon in educational research. His work is also representative of educational research that is undertaken for the purpose of influencing policy (e.g., government or school) and/or providing evidence in support of arguments (e.g., research commissioned by educational unions), potentially resulting in direct benefits for

teachers and improvement to their experience of teaching. There is great potential for educational researchers to extend their influence beyond the research community and ‘market their knowledge’ through partnership with key stakeholders; researching what is of importance to them. In addition, the ‘Handbook of Educational Policy Research’ (Sykes, Schneider, & Plank, 2009) draws from the expertise of researchers from multiple disciplines, highlighting the fact that educational policy research also has the potential for very fruitful cross-disciplinary research.

In summary, the chapters included in this section each seek to understand the complexity of teaching and the experience of teachers through the formulation of questions that focus on a single aspect of “the world [which] presents itself in practice” (Shulman, 1986, p. 6). They epitomise the variety of approaches in educational research and their contributions fulfil one or more of the requirements for educational research that is ‘educational’ (Ball & Forzani, 2007b); they:

- attend to the core problem spaces that educational researchers have unique expertise to probe;
- frame problems from a disciplined and identifiable educational perspective;
- bring educational expertise to bear on questions of measurement and design; and
- use tools and ideas from other disciplines in educationally-tailored ways.

They are each of intrinsic value, but by being ‘educational’, it is my belief that research such as this will be as relevant to teachers as it is to educational researchers and the research community.

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VAUGHAN CRUICKSHANK

CHALLENGES FACED BY THE MALE PRIMARY TEACHER: A LITERATURE REVIEW

Previous research suggests that challenges such as the isolation of working in a predominantly female environment, the profession's low status and salary as well as societal perceptions of sexual deviance are significant contributors to the low number of male primary school teachers (Cushman, 2005b). Further to this, Smith (2004) states that the declining number of male primary teachers is resulting in increased pressure and work for those who choose to remain in the profession. This chapter seeks to present a critical review of the literature to enable a deeper understanding of the male primary school teacher experience to be established. In doing so, this chapter identifies the challenges deterring males from entering and remaining in primary teaching and proposes directions for future research that examines the effectiveness of existing strategies and explores how these might be further enhanced.

This literature review is confined to studies that apply specifically to male teachers in order to maintain a distinct focus on the male teacher experience. Considerations such as discussing why we need more male primary teachers and contextualising male teachers within the broader field of teacher identity are identified as important aspects of research in this field. These topics have been the focus of other research in this area (Day, Kington, Stobart, & Sammons, 2006; Livingstone, 2003), but are outside the specific focus of this chapter. The intention of this chapter is to discern a clear overview of the known challenges and the strategies proposed to overcome them in order to provide purposeful and distinct entry points for evaluation and development of these strategies in future research.

CONTEXT

Numerous countries including Australia, New Zealand and the United Kingdom have experienced calls for increased male recruitment to and retention in the teaching profession, particularly to the primary area (Carrington, Francis, Hutchings, Skelton, Read, & Hall, 2007; Francis & Skelton, 2005; Martin & Marsh, 2005). The arguments for recruiting and retaining more men into primary teaching fall into four main categories: Academic reasons to address the perceived learning deficiencies of boys; social reasons to better cater for the social needs of boys; environmental reasons to attempt to balance the exceedingly nurturing climates of primary schools;

and representational reasons in order to make primary school staff a more accurate representation of society at large (Livingstone, 2003). The discussion of these arguments in greater detail can be found in Livingstone's research, as well as studies conducted by numerous other researchers, such as Carrington and McPhee (2008) and Farquhar (1998).

The Australian Bureau of Statistics (2012) showed that the proportion of Australian primary classroom teachers who are male dropped from 30% in 1981 to 19% in 2012. This downward trend is visible in many other developed nations. A 2001 report by the Organization for Economic Co-operation and Development (OECD) stated that the primary teaching profession is dominated by women internationally. Their data showed that it is typical for 80% or more of primary teachers to be female and listed countries such as Ireland, Portugal, Italy, Austria and Germany as examples (as cited in Vellinga Haaheim, 2007). Cushman (2008) noted that in New Zealand the percentage of male primary teachers had dropped from 42% in 1956 to 18% in 2005. Additionally, the General Teaching Council for England (2010) reported that only 12% of primary teachers in England at that time were male. Statistics from the United States are even more alarming, where male primary teacher numbers are reported as being at only 9%; the lowest level in 40 years (National Education Association, 2004). What makes these statistics even worse is the knowledge that these numbers include both specialist teachers and school leaders, meaning that the number of men in the generalist classroom is actually even lower.

The low number of male primary teachers is likely to be exacerbated in the near future because many of the male teachers currently in the profession are approaching retirement age. The *Australia's Teachers, Australia's Future* report by the Department of Education, Science and Training showed that the average age of Australian teachers had risen from 34 to 43 years during the 15 years to 2001, while the proportion of teachers older than 45 years rose from 17 to 43 per cent (Commonwealth of Australia, 2003). Males are concentrated in the older age groups, with 48% of the male teachers in Australian aged 45 years or older. Of particular concern is that females represent close to 80% of the teaching work force under 30 years of age, with only 41 per cent of female teachers aged 45 years or older. The more recent *Staff in Australia's schools 2007* report by the Department of Education, Employment and Workplace Relations notes that around 90 per cent of the primary teachers aged less than 25 years are female (Commonwealth of Australia, 2008). These statistics highlight a concerning situation of an increasing gap between the numbers of male and female teachers from early career through to retirement in Australia, as many male generalist teachers retire, they are not being replaced. This critical review of literature seeks to highlight the known challenges that may or may not be contributing to this trend and in doing so exposes directions for future exploratory research.

The effect of retirement on the decreasing number of male teachers has also been noted in other countries. Vellinga Haaheim (2007) reported that nearly 40% of male teachers in Canada are over 50 and approaching retirement; as well as a notable

decline in the number of men entering the teaching profession. In similar statistics to Australia, she noted that around one in four primary level teachers age 30 and over are men, but for men under 30 the number slips to one in ten. The implication from this is that the proportion of female teachers is likely to continue to increase, making it increasingly unlikely that many students will be taught by a male teacher at any point in their primary education.

LITERATURE

The prevalent themes emergent across the literature offer further insight and context to some of the challenges faced by male primary school teachers. The ensuing discussion critiques and draws together a broad range of perspectives and investigations to provide a comprehensive overview of what is currently known about male primary school teachers and their experiences of working within the profession. The emergent themes identified are: fear and uncertainty, role models for boys, societal perceptions of male primary school teachers, and schools perpetuating gendered beliefs and roles. Each of these will be discussed separately in detail.

DISCUSSION AND ANALYSIS OF LITERATURE

Fear and Uncertainty

Fear and uncertainty surrounding physical contact with students is a frequently suggested reason for the low number of male primary teachers. Mills, Haase and Charlton (2008) and Szwed (2010) both highlighted the anxiety that male primary teachers experience when faced with situations in which they want to show care and compassion to their students but are concerned about the possible ramifications. Deciding whether or not to risk touching a child they determine as being in need emerges as a significant challenge for many male primary teachers. Cooney and Bittner (2001) note that the uncertainty of which choice to make can often be less about the contact itself. Often it is more to do with worrying about what adults walking past his classroom might think if they saw him reassuring a child with a hug. Teachers of both genders agree that avoiding physical contact is a difficult task for teachers of young children as many children are 'touch sensitive'; especially when in need of support and reassurance (Smith, 2004). An obvious perception of inequity is revealed when a male teacher feels that he cannot comfort an upset child like a parent or female teacher could, without putting himself at risk.

The literature has noted that male teachers are extremely fearful of the possibility of being falsely accused of sexual abuse. Cushman (2005b) noted that 67% of the male teachers in her study rated the fear of being falsely accused of child abuse as a moderate or extreme concern. Whereas the male pre-service primary teachers interviewed by Lewis, Butcher, and Donnan (1999) were all constantly aware of and strongly affected by this issue. Participants reported avoiding all forms of physical

contact, even when comforting a student and wondered if it was worth going through four years of study when a single misinterpreted incident could potentially destroy a career. While many cases result in accused teachers being cleared of any wrong doing; their reputations, careers, self-esteem and health are often irreparably damaged.

The fact that very few schools have clear and gender equitable physical contact policies makes it extremely hard for new teachers, particularly men, to know where to set their boundaries. Cushman (2005b) observed that in the rare cases where schools do give direction on this topic, the advice is frequently followed by males and ignored by females; prompting her to ask if the advice was actually written for all teachers or just for males. The idea that one gender would fear the idea of making physical contact with a student whilst the other has been shown to ignore such guidelines reveals a disturbing disparity. While schools should endeavour to create workplaces that allow all teachers to be comfortable with using appropriate physical contact, the fact that male teachers might need to be given further help to construct their own strategies for becoming more comfortable in dealing with the challenges of this complex situation only serves to perpetuate the grossly inequitable notion that physical contact is more acceptable from and for one gender over another.

Role Models for Boys

The need for more men to provide positive role models for boys is one of major arguments for an increased recruitment and retention of male primary teachers (Cushman, 2008; Mulholland & Hansen, 2003). It has been argued that the 'over feminisation' of the teaching profession and the resultant lack of male teachers as role models disadvantages boys, providing a compelling reason for increasing the number of male teachers (Carrington et al., 2007; Commonwealth of Australia, 2002; Mills, Martino, & Lingard, 2004). Smith (2004) noted that both her interviews with male pre-service teachers and her discourse analysis of the Australian media between 1994 and 2004 provided significant evidence that male primary school teachers are frequently expected to act as role models and even surrogate fathers for their students. While many males have stated that being a positive role model as one of their motivations for becoming a teacher (Stroud, Smith, Ealy, & Hurst, 2000), meeting these demands whilst traversing vague expectations and seemingly unjust societal perceptions emerge as a key challenges for men across the existing literature. This is particularly relevant to males in the early years of their teaching careers and is made significantly harder by the dearth of material informing male teachers of exactly which characteristics they are expected to model. Details about the precise responsibilities of male role models appear to have been overlooked in the push to increase the number of male primary teachers, resulting in Cushman's (2005b) focus groups with male primary teachers in New Zealand revealing that they constantly reflect on and scrutinise their attitudes and behaviours because they know

their students are likely to link these to the male gender more broadly. While female teachers are also expected to be positive role models, their higher numbers give their female students more options to observe and choose from; therefore greatly decreasing the pressure on them.

Deciding if they should display the traditional hegemonic masculinity prevalent in wider society or a caring approach more consistent with their female colleagues is a major challenge for many male teachers (Smith, 2004). The question of which 'type' of masculinity they should model is made more challenging for male teachers due to the different and often conflicting opinions evident within the literature. Jones (2008) interviewed male principals in the United Kingdom who stated that male teachers are often characterised as either 'super-heroes' or 'demons'. The 'super-heroes' are those men who exhibit the 'right amount' of masculinity and display characteristics traditionally associated with men such as self-discipline, rationality and competitiveness. They are firm but fair disciplinarians; good at and interested in sports; and have a good sense of humour. 'Demons' are those men who have the 'wrong amount' of masculinity, usually too little. Jones states that this 'type' of male is often portrayed as an overly sensitive 'wimp' who is also perceived as having potential for paedophilia. While male teachers are understandably fearful of being categorised in this group, both Ashley (2002) and Cushman (2008) found evidence of schools wanting males to display behaviours that demonstrated that they had a caring 'feminine' side. Eleven of the principals in Cushman's New Zealand study stated that it was important for male teachers to deconstruct stereotypes by being caring, talking about feelings and showing emotions. More recent literature (White, 2011) points to the need for male role models who can display a range of different masculinities, rather than being solely the traditional 'super-hero' or the overly sensitive 'demon'. The breadth of opinion in these and other studies highlight the need to assist male teachers to understand their existing perceptions and evolve understanding and development of strategies to approach the challenges faced because many are fearful of being perceived as displaying the 'wrong' kind of masculinity.

Societal Perceptions of Male Primary Teachers

Public anxieties surrounding paedophilia continues to be a major barrier to men becoming primary teachers despite the fact that genuine accusations and convictions are very low (Carrington, 2002; Johnson, 2008; Skelton, 2001). There is also a perception that men who do not exhibit 'acceptable masculine behaviours' are liable to be suspected of being homosexuals and paedophiles (Martino & Frank, 2006; Mills et al., 2008). Smith (2004) noted the inference of homosexuality appears to come from choosing to work with women and that of paedophilia from choosing to work with children. Although these perceptions should be slowly eroding in the current climate of compulsory police checks for all adults both male and female working with young children, they have not gone away.

Research has shown that like their female counterparts, male teachers' primary motivation for joining the profession is to 'help others' and make a difference in children's lives (Lewis et al., 1999; Szwed, 2010). Despite this, Smith (2004) noted that male primary teachers are considerably disadvantaged because society perceives them as being potentially sexually deviant and therefore dangerous to children. Such perceptions can cause males to feel that their behaviour is under constant suspicion and surveillance, and this has the potential to significantly impact upon both their personal and professional lives and how they do their job. It appears that having to live and work in the face of these public perceptions is felt especially by male teachers, the stress of which appears to be a strong contributor to them leaving the profession.

Male primary teachers also have to deal with other social views such as overcoming disapproval from friends, family and the wider community for choosing what has traditionally been a female domain (Carrington, 2002; Szwed, 2010). Anliak and Beyazkurk (2008) encountered male teachers who believed that working with young children was an undesirable identity for men to have in society and avoided the topic of career when talking with other people due to fear of negative reactions. The low esteem these males hold the teaching profession only serves to further cultivate negative societal perceptions exist, and certainly does little to challenge or quash the perceptions that teaching is neither an appropriate nor valuable career choice for a male. Cushman (2005a) and De Corse and Vogtle (1997) found that participant teachers' parents, particularly fathers, considered teaching to be an unsuitable career for their sons. In contrast, Mulholland and Hansen (2003) found participants with parents who supported their career choice. Interestingly, the authors credited the parents' own lack of education and unhappiness with their jobs that involved manual labour; not a change in public perception. Mulholland and Hansen found that males' friends were more critical of their career choice than their parents were. This was due to friends seeing teaching as a 'soft' option, and also not understanding why people would want to return to school. The authors believed that their reasoning was primarily influenced by a lack of understanding of what a teacher does, and the fact they had not enjoyed school as students themselves.

The low salary and low status of teaching, particularly primary teaching within society has often been presented as a significant contributor to the low number of men entering and remaining in the profession (Cushman, 2007; Foster & Newman, 2005; Carrington, 2002). It appears that the teaching profession suffers from a societal view that only people unable to achieve success in other areas become teachers, and it is noted that this perception is not confined to a single gender. Despite numerous attempts (Queensland Government, 2002) to encourage men to become primary teachers, the societal views of primary teaching as a female dominated area continues to be a significant challenge for men entering and remaining in the profession (Cushman, 2005a; Skelton, 2009); with Lewis et al., (1999) even encountering students who had been 'actively discouraged' from pursuing the profession by their high school teachers. This does not bode well for Australia with

the upcoming retirements of the baby boomer generation likely to result in major teacher shortages across the country.

The media is another significant factor in the societal perception and status of teachers. The Senate Employment, Education and Training References Committee noted that the media often prefers to report on the failures of schools and teachers rather than their achievements, and regularly reinforces societal stereotypes and prejudices (Commonwealth of Australia, 1998). More recent research from Thornton and Bricheno (2008) noted that the status of teachers has improved considerably in the United Kingdom over the last decade due to the education focus on the Blair Government. This is a positive development, but more needs to be done in Australia and many other countries to give teachers the status and recognition they deserve.

Schools Perpetuating Gendered Beliefs and Roles

While male primary teachers would likely benefit from more progressive societal views and a more positive representation in the media, schools are also important in helping men overcome the challenges they face in the profession. Cushman (2005a) states that

The schooling system, despite radical changes in gender roles in society, still tends to perpetuate traditional notions of masculinity, with expectations that males will aspire to and dominate roles associated with management, discipline and physical activity and avoid the more nurturing behaviours associated with teaching younger children. (p. 322)

Haase (2010) also questions why male teachers are expected to assume particular roles when one of their female counterparts would often be more effective in these roles. These roles usually include coaching sports teams, being in charge of discipline and being responsible for 'masculine' subjects such as physical education and computing (Mills et al., 2004). Cushman (2010) noted that all the male teachers in her study had sports leadership roles in their schools. Despite some of them being initially reluctant, they had 'accepted' that it was expected of them as males and felt it was easier to acquiesce than 'step on toes'. Although many male participants in these studies did not view these roles as a negative while there were other males in the school,

Smith (2004) noted that the declining number of male primary teachers is intensifying problems such as isolation and workload for those who remain. Extra duties such as helping with physical jobs, constantly attending excursions and camps to meet the required accompanying males ratio and having boy heavy classes because of parents' requests for their sons to have a male teacher can be a significant workload increase for some teachers. Sargent (2000) believes that if males are given classes with higher numbers of boys and behaviour problems, then schools may create a 'self-fulfilling prophecy' with male teachers having to spend more time on

discipline issues and therefore being seen as more authoritarian than their female colleagues. King (1998) further suggests that the increase in boys misbehaving and under achieving could be as a result of 'the more rigid' teaching styles used by male teachers with more difficult classes.

The concept of isolation of male teachers in the profession is commonly reported in the literature (Skelton 2009; Anliak & Beyazkurk, 2008). Lewis et al. (1999), further states that male primary teachers often find themselves in a school where all their colleagues are female and the same age as their mothers, and with their only male companions being the groundsman or the principal. Kauppinen-Toropainen and Lammi (1993) noted many male teachers who stated that they preferred to spend their break times in their office alone or in the playground with students, rather than with their female colleagues. The authors further noted that male primary teachers "found it difficult to fully integrate into female-dominated work teams and they missed male companionship" (p. 101). DeCorse and Vogtle (1997) note that the failure to resolve this conflict is likely to be a considerable barrier to male primary school teacher retention.

Many of the participants in Cushman's (2005b) study noted the staffroom as being one of the places where gender differences are often highlighted. They reported the conversations of their female colleagues as being around children, relationships and clothing; and often got 'a hard time' if they joined in and steered the conversation towards more common interests. Many males experienced being asked about topics their female colleagues perceived as being of interest to them; these usually included sport and vehicles. This could have the effect of further ostracising men who were not interested in these topics. Another common issue was that of older female teachers trying to 'mother' young males and treating them like children. Most males in Cushman's study saw their interactions with their female colleagues as being "more amusing than anything else" (p. 8). Despite this, examining the level to which female teachers perpetuate societal gender stereotypes is an important facet of addressing the issues faced by male teachers in schools as all staff should be responsible for helping deal with the issues confronting male teachers. Unless female teachers develop an awareness of their behaviours in regard to gender stereotyping, there is little likelihood of change (Younger & Warrington, 2008).

CONCLUSION

There are numerous challenges for males working in primary schools due to challenges surrounding working with young children and in a female dominated environment. Current literature highlights the need for Government, schools and the media to work together to raise the status of teaching, thereby contributing to societal acceptance of males teaching young children. All levels of Government must continue to support and promote the positive work of schools in the community. The media must be encouraged to present a balanced picture of teachers and schools rather than sensationalising negatives and glossing over or ignoring positives. School leaders

need to take the lead in making their schools comfortable and equitable working environments for their teachers, regardless of their gender. It is proposed that a focus of equity rather than clarifying what is acceptable and not acceptable for male and female will foster a gender inclusive environment that places emphasis upon gender balance, inclusivity and equality rather than gender division and fear. This will involve having more than one male teacher on staff, developing clear policies about physical contact and raising the awareness of female staff in regards to their vital role in supporting their male colleagues.

While many of the studies referred to in this chapter have focussed on the challenges for, and disadvantages to being a male within the profession (Cushman, 2007; Smith, 2004), some have presented possible strategies for overcoming these challenges. Although these are touched on in this chapter, many require significantly more exploration and explanation. Although these challenges have been widely conceptualised and reported on, and some suggestions made for dealing with them; further research needs to be undertaken in relation to helping males develop effective strategies to overcome these challenges. This will be a complex undertaking due to the diversity of perceptions associated with these challenges, but is vital to clarify and rectify these in order for successful future improvements to male primary teacher recruitment and retention.

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ABBIEY MacDONALD & TIM MOSS

THE ART OF PRACTICE: EXPLORING THE INTERACTIONS BETWEEN ARTIST PRACTICE AND TEACHER PRACTICE

In recent times, the similarities and differences between artists and teachers, particularly in relation to artistic practice and teaching practice have gained the interest of an increasing number of researchers (Graham & Goetz Zwirn, 2010; Carroll, 2006; Davis, 2008; Stewart, 2003). Hoffman-Kipp (2008) suggests that teaching is “reflective of the intersection of personal, pedagogical, and political participation and reflection within the larger socio-political context” (p. 153). As is the case for teachers, Stewart (2003) suggests that artists bring to their practice an array of complex skills, perspectives, interests and talents. It is also acknowledged that arts practice is “a dynamic process and complex activity that is socially constructed” (2003, p. 2). The identity of the artist ‘grows’ both in and through the practice of art making (Carroll, 2006), allowing artists to respond and make meaning of experiential and external influences through their practice. These processes that inform an artist’s identity are complimentary to social constructivist approaches utilised in teaching, where real life activities, reflection and collaborative construction of knowledge are embraced (Churchill et al., 2011). There are synergies between an artist’s practice and a teacher’s practice, particularly in relation to identity formation. Both artists’ and teachers’ perspectives, experiences and processes are informed by personal experience but are also given professional status through successful immersion within their practices (Stewart, 2003). For artists this means public exhibition of work and for teachers honing the art of teaching and exhibiting their practice in front of a class. Stewart (2003) proposes “the resulting stories are placed in historical, social and cultural contexts” (p. 14), which are reflected on by artists and teachers in order to refine their practice.

THEORETICAL BACKGROUND

According to the Tertiary Art Education Group of Victoria (TAEGV) (2011), a clear description of quality art teachers can be conceptualised when we make explicit what it is that “high quality art teachers should know and be able to do” (p. 1). This is in many ways an obvious or expected statement, however Art teachers’ understanding regarding expectations of what they should know and be able to teach is presented as

problematic in the most recent review, *Response to the draft Australian Curriculum: The Arts: Foundation to Year 10* (Art Education Australia [AEA], 2012). The review suggests that there is little evidence within the current content elaborations or standards that satisfactorily details teachers' implementation of the Arts across the Curriculum. From a futures perspective, the challenge of accurately conceptualising what a high quality art teacher should know and be able to do becomes problematic when the implementation descriptors of the proposed curriculum are purported as being "inflexible, unclear and incoherent" (AEA, 2012, p. 17).

The TAEGV (2011) provides three main requirements that all art teachers must satisfy, which include qualifications relevant to the level/s they teach, conducting their professional learning in a responsible and ethical way, and having a personal philosophy of art and teaching that is conveyed in their teaching practice. Separate to this description of the requirements for art teachers, the TAEGV have also prepared statements pertaining to the profile of the "high quality art teacher" (p. 1). These statements list a variety of aspects such as comprehensive professional knowledge, professional qualities and professional practices that high quality art teachers should aspire to and maintain if they are to be considered 'high quality' art teachers, such as actively contributing to the "wider professional field of the arts and education" (p. 2).

It must be asked how useful these above mentioned desirable professional skills, knowledge and attributes will be to the high quality art teacher whilst the current *Response to the draft Australian Curriculum: The Arts* (AEA, 2012) states that the present visual arts "achievement standards do not explain what students should know and be able to do" (p. 22). Given the present ambiguity, it is understandable that these descriptors could be easily interpreted (and fulfilled) in various ways; One way might be for art teachers to develop their personal artist identity and practice, or what Ewing describes as "teaching as artistry" (2010, p. 43) and draw from this to inform and enrich their approaches to art teaching. Part of the challenge at present for those who teach and make art is ascertaining the significance of their artistic practice in relation to their teaching practice, and understanding the concrete ways in which the two practices can genuinely and purposefully come together in shaping an artist teacher identity. This is difficult to conceptualise due to present ambiguity pertaining to what is expected, assumed and proposed within the visual art teaching and learning 'landscape' at a national level; at this point in time, the status quo appears fraught with both inconsistencies and ambiguities.

The Arts and Australian Education: Realising Potential (Ewing, 2010) review suggests that genuinely transformative learning opportunities require aesthetic educators who can "help children make meaningful links with their minds, bodies and emotions" (p. 34). Referred to within this review is the phrase 'teaching as artistry' which is described by Eisner (2002) and assimilated to approaches of high quality art teaching; where "good teaching depends on artistry and aesthetic considerations... Artistry is most relevant when we acknowledge its relevance to teaching" (p. 382). The concept of teaching as artistry requires art teachers to possess artistic "sensibility, imagination and technique" (Eisner, 2002, p. 382)

and be prepared to make and action meaningful connections between art making and teaching.

The perceived benefits of engagement in such artistic pursuits as described above have been identified and explored by a number of researchers (Astin, 1993; Graham & Goetz Zwirn, 2010; Kind, de Cossen, Irwin, & Grauer, 2007). According to Graham and Goetz Zwirn (2010), art teachers' involvement in artistic pursuits and activities makes a distinctly positive difference to their classrooms and schools, and can enhance their pedagogical approaches to art teaching, how they construct learning environments, and their sense of professional identity. This idea is supported by Bachar and Glaubman (2006), who agree that art teachers who model their classroom on their own arts practice can respond most intuitively to their students' needs. The pedagogical approaches these art teachers adopt "are supported by practical expertise and personal involvement in art making" (p. 9), which best fosters a flexible, authentic and inclusive visual art learning environment.

The TAEGV (2011) statement on quality art teaching suggests that this contribution to the professional field of arts might be further supported by the teacher "engaging with professional State teacher associations and other arts organisations, and by reading their journals and newsletters" (p. 2). This willingness would be of particular value for teachers (especially those beginning or in pre-service) given that some studies have already established how many teachers can become stifled by overbearing constrictions within some school systems, and subsequently become less likely to take risks and explore their or their students' creativity (Ewing, 2010; White & Smerdon, 2008). As has been suggested, there are many ways to interpret how art teachers might work to satisfy this requirement of professional artistic interest and commitment in order to be deemed a high quality art teacher.

The things that artists do all the time are things that students need to be able to do; collaboratively forming alternative solutions to problems, being persistent, adjusting something after making a choice, taking responsibility for decisions and looking at all options (Sinclair, Jeanneret, & O'Toole, 2009; Rabkin & Redmond, 2006). This suggests that a secondary art teacher's pedagogy that is informed by their artistic practice should ultimately enrich and enhance the quality of their students' learning. Several recent studies have highlighted some of the pedagogical approaches that assimilate and/or overlap with artistic processes and practice (Burke, 2006; Carroll, 2006; Hall, 2010; Hatfield, Montana, & Deffenbaugh, 2006; Jarvis, 2011; Graham & Goetz Zwirn, 2010), and note varying degrees of difficulty and intricacy involved in exploring this area. According to Hall (2010), the development of arts teaching pedagogy is a "complex and idiosyncratic process informed by many variables, including personal and professional identities as a teacher and an artist; personal and pedagogic philosophy and approach, the ethos and character of their school and the stage of their career" (p. 109). It is not simply a case of 'if I can do it well [make art], then I can teach it well'. Despite the complexities inherent in trying to understand the specific ways artistry and pedagogy can complement and conflict with each other, deeper understanding will not be obtained without further investigation.

The *National Review of Visual Education* (Davis, 2008) found that despite numbers of graduate specialist art teachers rising in Australia, there is still 'disquiet' in relation to their preparedness to teach visual art effectively. The fact that the majority of art specialists enter pre-service teacher training with "studio art and/or art history backgrounds" (Davis, 2008, p. 177), does not mean that they have successfully "developed the knowledge, skills or conceptual understandings necessary to teach visual art" (Grauer, 1998, p. 20). Graham and Goetz Zwirn (2010) echo this point by stating "being an artist does not mean that great [art teaching] pedagogy will follow" (p. 8). This notion of successful artistic practice not equating to successful teaching pedagogy has the potential to cause some confusion to the pre-service art teacher. Palmer (2007) suggests that good teaching practice comes directly from the identity and integrity of a teacher. Also, if naïve pre-service teachers identify themselves as having an artist identity, they could be forgiven for assuming that this should therefore transpire to successful art teaching practice.

The literature appears to confirm that while experience and proficiency in arts practice is beneficial to the art teachers' teaching practice, it [arts practice] alone does not equate to pedagogical proficiency. "Teaching is an enormously complex endeavour requiring judgment and skill that extends far beyond the knowledge of any particular discipline" (Graham & Goetz Zwirn, 2010, p. 8). It would be naïve for a teacher to assume that any existing artistic identity and practice simply equates to an ability to provide high quality art teaching (TAEGV, 2011). Such an assumption also serves to undermine the intricacies and artistry of teaching. Nevertheless, teachers' artistic endeavours and engagement have the ability to shape pedagogy in significant ways that can profoundly influence how they interact with their students, shape visual art learning environments, and communicate their field of knowledge (Graham & Goetz Zwirn, 2010).

METHODS AND TECHNIQUES

In the following section of this chapter, we provide accounts of events from one of the researchers' [Abbey's] professional career, providing insights into her experiences of teaching and maintaining her artistic practice as a painter during the first two years of secondary art teaching. The accounts are presented in an attempt to elucidate the specific ways in which artistic practice and teaching practice can inform one another. The autoethnographic accounts are intended to provide further professional context to how Abbey's artistic practice contributed to and detracted from her teaching practice (Graham & Goetz Zwirn, 2010) as a secondary art teacher in a Tasmanian school. Comparative analysis has been used to illustrate what is currently known and Abbey's experiences of the tensions between her artist practice and teaching practice. It is intended within the following section that others will interpret these accounts through their own perspectives. These accounts do not stand alone; they are intended to provide a place where the perspectives of the authors and

readers can converge, all of whom bring myriad perspectives and have the potential to construct multiple interpretations (Barone & Eisner, 2012).

Within this paper, autoethnography has been used to elicit and explore places where one's sense of self and one's subjectivity is constructed (Richardson, 2000, Sameshina, 2008). Autoethnographic narrative excerpts are presented to help facilitate reader engagement and provide explicit context, through which some of the complexities raised in the cited literature can be explored. Through autoethnography, we share how Abbey's artist and teacher identities interchange, overlap and entwine in artist teacher practice. The autoethnographic accounts we present reflect personal stories that are both constitutive and performative (Holman Jones, 2003).

An outline of data collection techniques allows insight into the process through which this autoethnography was conducted. Abbey adopted the practice of tracking or recording her experiences throughout her final year of teacher training within a rigorously maintained reflective diary. Engaging in critically reflective practice saw Abbey searching for and reflecting upon "assumptions of power and hegemony" (Brookfield, 1995, p. 26), which allowed her to achieve the sense of finding ground that critical reflection delivered to her when she deeply examined the origins of her understandings and assumptions. For her, this was about finding clarity around the implications of her artistic practice for her as a teacher, and how she could use this understanding to better negotiate the uncertainties of her first years of teaching practice. For Hickey and Austin (2007), the reflection necessitated through autoethnography creates possibilities for critical reflexivity, wherein self and agency come to be understood in terms of the social processes that mediate the lived experiences. Within this paper, we draw parallels between Abbey's lived experiences of negotiating artist and teaching practice during her first two years of teaching, and what these experiences reveal about some of the complexities inherent in negotiating artist teacher identity.

Abbey kept these reflective journals from the last semester of her final year of teacher training (2006) through to the end of her second year of teaching in a secondary school (2009). As a teacher and artist participating in this study, Abbey's reflection provided a means of meditative and contemplative practice in the examination of her own and others' lived experiences. This demonstrates her openness to the "complexity of the relations amongst things and people" (Carson & Sumara 1997, p. xv). Subsequently, her autoethnographic stories, like artworks, provide a concrete object around which further dialogue and discourse can take place. Abbey used three methods for recording her reflections: an electronic journal, her art journal, and audio reflections; all of which have contributed to informing the autoethnographic extracts provided herein. Having multiple points for input made it much more accessible and the rich variety of reflective methods was conducive to exploration and depth. This also helped address what Kasten and Ferraro (1995) found where "teachers were not likely to maintain their previous level of reflection" (p. 3) post pre-service teaching. Abbey consistently maintained an average of three

comprehensive journal entries per week over three years including two as a full time secondary art teacher. Within her journals, she gave detailed storied accounts of her experiences in the classroom, interactions with colleagues, perceived successes and failures as an artist and teacher, her fears, insecurities, strengths and growth. Abbey then utilised narrative thematic coding as a means of exploring the emergent themes within her stories that related specifically to artistry, pedagogy and renegotiating artist teacher identity. This coding process allowed for the identification of richly detailed insights pertinent to the 'how and why' of particular outcomes (Saldana, 2009) in her artistic practice and teaching practice. Abbey then conducted a comparative analysis of the literature, which allowed her to draw parallels and contextualise her own experiences in light of what the research reveals about maintaining an artist practice and a teaching practice.

DISCUSSION: THEMES FROM THE NARRATIVES

This section presents and explores the analysis of themes emerging from the journal data, and what these reveal about some of the complexities of artistic practice and teaching practice evident in recent literature. The themes are identified as: Tension, Conflict, Reciprocation, Negotiation and Balance. Within the discussion section, which is presented in first person from Abbey's perspective, contextual extracts from the journal narratives are presented in italics.

Tension

During my first six months of teaching, my classroom practice began to reveal to me some inconsistencies between my beliefs about how united or cohesive my artistic practice and teaching practices and approaches actually were in and outside the classroom context. *I try to embrace the idea of exploring and learning through trial and error in both my teaching AND artist practice. In my mind, this idea clearly informs my art teaching pedagogy.* Whilst I initially believed I was teaching who I am and what I do (Palmer, 2007) as an artist, I began to doubt my understanding of teacher knowing and connectedness (Churchill et al., 2011) in practice. *I find myself saying things like "just have a go and see what happens" to my uncertain students... when I see some students' difficulty in accepting such guidance, I feel a creeping familiarity.* This caused tension between my artist and teaching practices, and my perceptions of how I thought these came together in the classroom context as I came to realise, *I do not honestly embrace this idea of learning through trial and error myself as an artist, as I'm terrified of making a mistake.*

I found myself preaching one thing in the classroom, but being ashamed to find myself *unable to 'walk my talk' outside the classroom.* The term artist teacher requires and "involves a philosophy of teaching based upon artistic practice" (Daichendt, 2009, p.2); my inability to base my teaching practice honestly upon my artist practice *forces me to question whether or not I can call myself an artist teacher.*

This realisation of my own in-authenticity created a crippling sense of insecurity within my fragile and transient (Cohen-Evron, 2002; Corley, 1998; Huberman, 1989; Veenman, 1984) beginning artist teacher identity. The implications of this realisation had the potential to significantly damage my progress of negotiating artist-teacher identity, as many of my decisions in the classroom context were being governed by conflict within my artistic practice that was both deeply rooted and unresolved.

Conflict

The conflict rooted within my artist identity, if left unaddressed, had the potential to contribute to my development of a weak or conflicted professional artist teacher identity (Chapman, 1982; Day, 1997; Graham & Goetz Zwirn, 2010). *This was of great concern to me as I felt the pressure to perform to the level of my more experienced colleagues.* Despite the pressure to perform to a certain standard or in a certain way, it has been said that teachers' artistic pursuits and activities make a distinctly positive difference to their classrooms and schools, and can positively influence their pedagogical approaches to art teaching, how they construct learning environments, and their sense of professional identity (Graham & Goetz Zwirn, 2010); however, a beginning artist teachers' ability to successfully interweave artistry and pedagogy in harmonious and reciprocal ways is questionable during the first years of professional practice. *Teacher engagement in arts practice was expected and celebrated within my school's art department, and this saw me placing much pressure upon myself to not only excel as an artist teacher, but also as an artist.* This is indicative of implications of placing increased pressure and expectations upon the beginning artist teacher, disregarding the complex negotiation and transformation that occurs for them as they struggle to negotiate and construct an artist teacher identity during the first few years of professional practice (Britzman, 1991; Cohen-Evron, 2002).

Not only is there the potential for the beginning artist teacher to be confronted with negotiating conflict within and between practice and context and expectations and assumptions about how they perform as artist teachers, there is also conflict evident within the literature. The perceived benefits of engagement in arts practice by art teachers is well documented (Astin, 1993; Kind et al., 2007; Zwirn, 2002); however, there are also those that insist this is very difficult to do in practice (Chapman, 1982; Day, 1997; Hall, 2010; Hatfield et al., 2006; Zwirn, 2002). This does little to help the beginning artist teacher resolve conflict between the competing demands of artistry and pedagogy, or to clarify *how* balance between artist and teaching identity and practice can be achieved.

Reciprocation

The realisation of inconsistency inherent between my artist and teaching practices and beliefs forced me to confront some of my insecurities and vulnerabilities as

an artist. I may have otherwise continued to overlook this conflict within my arts practice had it not been otherwise revealed through reflection upon my teaching practice, specifically *the discussions I had with my grade ten students as an artist*. They helped me genuinely come to understand how forming alternative solutions to problems, being persistent, adjusting something after making a choice, taking responsibility for decisions and looking at all options (Rabkin & Redmond, 2006; Sinclair et al., 2009); were of equal importance to an artist's practice and a teacher's practice.

I built strong rapport quickly with this class during the later six months of my first year of teaching, as I resolved to be completely honest, transparent and candid with them about my practices as an artist and teacher. *This class inadvertently made me think about myself as a maker of art; my fears of judgement and criticism. I truly did not expect this... I am humbled by them*. The expressive tools and concepts of art processes are able to provide endless possibilities for exploring new ways of thinking, imagining, communicating and making meaning (Wright, 2003) while enabling a sense of self-belief in one's own expressive competence and potential (Bernstein, 1996; Burke, 2006; Hall, Thomson & Russell, 2007). *I have formed an honest and mutually nurturing relationship with this class... we give to each other generously, and take from each other hungrily*.

I believe this is indicative of the important roles students play in regard to reciprocity between artist and teaching practice, particularly for the beginning artist teacher. *They learn from me and I from them*. Both the artist and teacher reflect upon and make meaning of experiences in and through practice (Carroll, 2006), whether it be in relation to works of art or through interaction and dialogue with the students they teach. The experiences a teacher has as an artist have great potential to expand possibilities of *what* to do and *how* to do in the context of visual arts learning the classroom (Graham & Goetz Zwirn, 2010); however, in order to do this effectively, the artist teacher must first be able to effectively facilitate reciprocation between their artist and teacher practices.

Negotiation

If negotiating an identity that "integrates the teacher self or persona with an artist self is not a straightforward or always comfortable process" (Hall, 2010, p. 107), the beginning artist teacher not only has this negotiation to contend with, but also has the negotiation of making the transition from pre-service to professional teacher during their first year of teaching. Frustration is evident in my own experiences of attempting this negotiation, where *I'm not sure whether my teacher and artist identity are separate things or whether they should come together, and what this might see me doing in practice*. One approach might be to place increased focus on the practical ways that artistry and pedagogy can be used to enrich, enhance and further develop each other, rather than emphasis being placed upon the difficulties of doing so. I attempt to elicit some practical steps to approaching this negotiation by

starting to incorporate my 'artist' self through use of dialogue, and demonstration of practice through the modelling of specific techniques I use in my practice. If it is true that artist teachers successfully negotiate balance between art making and art teaching “when they effectively weave the pursuits of teaching and art making into a tapestry of complementary activities” (Graham & Goetz Zwirn, 2010, p. 56), my own experiences of negotiating this balance reflect a need for further detail of what these ‘complementary activities’ look like in the practical context of the school and classroom. The beginning artist teacher is still in the process of making the transition from pre-service to professional practice; “putting values and beliefs into practice...making real decisions about how to teach based on pre-service professional knowledge” (Churchill et al., 2010, p. 15) and testing the solidarity of this knowledge. Having access to a range of various approaches and examples of how different teachers weave complementary activities between artistry and pedagogy as an artist teacher *would have allowed me to better understand and negotiate between how I was (or was not) working as an art teacher or as an artist teacher.*

My ability to achieve, lose, regain and maintain balance within and across my teacher and artist practices is a particularly strong theme. My own experiences mirrored much of the research that highlights the potential difficulty in achieving and maintaining this balance between artist and teacher practice and identity (Chapman, 1982; Day, 1997; Hall, 2010; Hatfield et al., 2006; Zwirn, 2002). Over the first two years of my beginning teaching practice, I did not feel my artist practice and teaching practice working in a harmonious and reciprocal way often enough to obtain a consistent sense of professional satisfaction. *Honestly, I only ever catch fleeting glimpses of how an artistic practice and teacher practice can happily coexist in the classroom.* However, when I did manage to get the two [practices] to complement and genuinely inform each other *it was incredibly powerful...I actually liken the experience to mixing a perfect shade; I usually make it accidentally, but it's absolutely perfect...and the appreciation of this perfection comes from the knowledge that I'll probably never get this perfect shade again.* I found that when I stopped putting pressure on myself to be an artist teacher, I'd suddenly catch myself, or become aware that *I was able to explain my artistic intentions in that particular painting with the clarity and careful articulation of a teacher.... I would never have been able to do that twelve months ago [prior to teaching]... I'd be much more awkward or cryptic.*

My own experiences of negotiating artist teacher identity revealed that only when these two practices worked together, with and for each other in a balanced and reciprocal way, *I truly felt like an artist teacher.* Several scholars explore this interaction (Daichendt, 2009; Hansel, 2005; Hickman, 2010), including Chapman (1963) who sees these two activities - teaching and making art - actually supporting one another, despite being difficult to balance. It became glaringly obvious to me very early on that I had some misconceived ideas about how smoothly I would be able to renegotiate the transition from pre-service to classroom artist teacher and achieve this balance. *I was naively unaware of just how difficult this would be to*

do in practice. At times I struggled with which practice should take precedence and when, and particularly in the first six months of professional practice *both practices* [artist and teaching] *at times are unbending... unwilling to come together... I feel like I should be concentrating on being just a teacher right now*. The difficult balance touched on by Daichendt (2009) and Hickman (2010) was mirrored in my own experiences, although the fleeting moments of balance I did manage to achieve *really motivated me to persevere in my pursuit of balance* between artist and teacher practice and identity.

CONCLUSION

In this paper, we have reviewed literature that explores both the shared and unique aspects of artist and teacher practices. Many researchers (Daichendt, 2009; Hall, 2010; Hickman, 2010; Zwirn & Goetz, 2010) emphasise the synergy evident between artistry and pedagogy, or arts practice and teaching practice. However, my own experiences of successfully negotiating a balance between my artistic practice and teaching practice, whilst making the transition from pre-service to professional practice proved problematic. Arts practice, like teaching practice, evolves through processes of practice and reflection; both the artist and teacher reflect upon and make meaning of experiences in and through practice (Carroll, 2006), whether it be in relation to works of art, or the classrooms in which they teach. Such statements further exemplify the similarities in process that both teachers and artists go through in order to explore, refine and gain deeper understanding of the ‘art’ of their practice. Davis (2008) describes these processes as typical of ‘artful teachers’ (those who utilise art, and artist practices and processes to enrich, enhance and inform their pedagogical perspectives), and that these kinds of teachers have the vision and power to persistently challenge norms; rewrite the boundaries, definition, and objectives of education. Such insights are of particular significance if we are to work towards genuinely resolving the apparent ambiguities within conceptualisations of what quality art teaching includes (Ewing, 2010; TAEGV, 2011) and what visual art learning involves (AEA, 2012) within the future context of the national *Australian Curriculum: The Arts* (Australian Curriculum, Assessment and Reporting Authority, 2010).

Despite the similarities and synergy apparent between artistic practice and teaching practice a delicate balance within and across arts practice and teaching pedagogy is required, particularly during the first few years of professional teaching practice, as the pre-service secondary art teacher negotiates the complex transition to artist teacher. For the beginning artist teacher, support in the way of explicit example, guidance and purposeful reflection might help to lift “the shroud of silence in which practice is often wrapped” (Brookfield, 1995, p. 35), further revealing *how* synergy between artistry and pedagogy might be achieved by the beginning artist teacher. The tension and struggle inherent in this transition from pre-service to classroom teaching reveal how delicate balance is required to ensure artist and teaching practice

do not overwhelm each other during the first formative years of professional artist teacher practice. The researchers propose that when an artist identity and practice is pre-existing, the beginning artist teacher must first learn to negotiate the various discourses as part of becoming a teacher before they can effectively tackle the delicate negotiation required to achieve balance between artist and teacher practice.

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AN HISTORICAL EXPLORATION OF CREATIVITY RESEARCH

Teacher understanding of the concept of creativity in relation to the educational context is vital to improved teaching and learning practices aimed at preparing effective thinkers, innovators and problem solvers of the future (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2010). This chapter highlights one component of my current doctoral study that aims to explore pre-service teachers' perceptions of their own creativity and resilience in preparing for the teaching profession, and how those perceptions influence their developing classroom practice. While substantial research exists in the fields of creativity and resilience as independent notions, examination of the inter-play between the two areas in relation to shaping pre-service teacher practice is limited. Engaging with the literature on the subject of creativity has been the starting point of this study, and forms the content of this chapter. The broader study which will, in part, be informed by this exploration of historical research into creativity, will take a narrative inquiry approach, both to the phenomenon being studied and in reporting the data. The study will comprise a longitudinal exploration of pre-service teachers' on-campus experience of studying and how this is shaped by, or shapes their perceptions of, their own resilience and creativity, and of their professional experience placements in educational contexts. Data will be collected through a three-part interview process (Siedman, 1998) and analysed narratively (Ollerenshaw & Creswell, 2002). This chapter traces the development of understandings about creativity as a phenomenon, and as a field of inquiry, across time and cultures, and outlines the major impact this thinking has had on how creativity is conceived of and understood, particularly in relation to contemporary educational contexts. This is significant given creativity's explicit inclusion as a general capability in the Australian Curriculum (ACARA).

A HISTORY OF CREATIVITY RESEARCH

While creativity has only been identified as a researchable concept in its own right within the last 100 years related philosophical discussions with deeply embedded or covert notions of creativity have long been held. Traditional views of Greek and Roman culture saw creativity being linked to, or emerging from, the divine (Keneller, 1965, as cited in Finke, Ward & Smith, 1996). With the rise of Christianity, creativity was considered the sole province of God (Albert & Runco, 1999). It is only in

relatively recent times that professional discourse, articles and texts focused on creativity emerged and key psychologists such as Freud, Piaget, Rogers and Skinner engaged in meaningful explorations of creativity (Guilford, 1950; Albert & Runco). The latter decades of the 20th Century saw an enormous escalation of interest and research in the field by artists, educators and scientists, as awareness of and curiosity about creativity as an expression of the nature of humankind increased (Finke et al.).

Thinking around creativity was relatively stable and uni-directional in pre-Christian times and could perhaps, be likened metaphorically to a slow growing tree trunk. However, the branches of the creativity-research-history-tree are now far reaching and multi-directional, and perspectives on the topic are equally diverse. Whether studied conceptually, historically or experimentally, it is the bridging of creativity conceptualisations and research that has been significant for an understanding of creativity in relation to human experience (Albert & Runco, 1999). It is widely acknowledged in the field that

... it took another 150 years after research was a recognised and widely encouraged institutional undertaking before the concept of creativity was sufficiently sculpted out of the many debates regarding the meaning and eventual separation of such competing ideas as imagination, originality, genius, talent, freedom and individuality. (Sternberg, 2006, p. 17)

According to Kaufman (2009) the history of creativity as a researchable idea can be divided into two distinct eras: pre and post-1950. Limited research took place before John Guilford's seminal presentation to the American Psychological Association's 1950 convention where he appealed to the field to take notice of creativity as a concept (Csikszentmihalyi, 1988; Finke et al., 1996; Kaufman, 2009; Taylor, 1964). While little creativity research was documented pre-1950, many researchers had, to some extent, 'unwittingly' considered it while focusing on other areas of interest (Kaufman). Post-1950s conceptualisations of creativity can be traced to pre-Christian understandings, and it is there the history begins.

Pre-Christian Understandings of Creativity

During Plato's time (427-327 BCE) and for many subsequent centuries, creativity was perceived as divine: creativity was external to the individual (Feldman, Csikszentmihalyi & Gardner, 1994; Sawyer, 2006). Greek Muses reconciled inspiration from the Gods and Plato dictated what the Muses had spoken (Kaufman, 2009). According to Albert and Runco (1999) Greek, and later Roman, cultures developed the notion of "an external creative 'daemon' (Greek) or 'genius' (Latin), linked to the sacred" (p. 18) which aligns closely with contemporary understandings of creative talent. The Romans viewed this genius as a unique male quality or power, with the exception of child bearing (Albert & Runco). Creative 'genius' became socially valued and for hundreds of years was associated with personal attributes of "madness and frenzied inspiration" (Albert & Runco, p. 18). For many centuries

little changed in terms of generally accepted understandings of creativity. From Plato and Aristotle and through the rise of Western Christianity, creativity was viewed as external to the individual; a matter of divine inspiration.

An Eastern View

Unlike Western understandings of creativity, Eastern philosophical and religious views on creativity remain largely unchanged into the 21st century. Hindus, Confucianists, Taoists and Buddhists do not entertain the notion of creativity as external. In these philosophies and religions creativity is viewed as revealing that which already exists, or imitation and adaptation of existing ideas (Albert & Runco, 1999). The Eastern view of creativity emphasises personal fulfilment, intrinsic worth, and the expression of “an inner essence or ultimate reality” (Lubart, 1999, p. 340). Sarnoff and Cole (1983, as cited in Lubart) claim that this Eastern notion of creativity closely resembles Western “humanistic psychology’s conception of creativity as part of self-actualisation” (p. 340). This may indicate Western views and understandings drawing on older, more stable Eastern philosophies. Eastern conception favours the creative person who endeavours to find his/her inner reality and become one with it through meditation and self-realisation, re-invigorating that which is lying dormant in his/her own self (Maduro, 1976, as cited in Lubart, 1999). The Eastern view is yet another branch of this complex tree of understandings about creativity. However, it becomes apparent through the following historical journey of creativity research that some branches of the Eastern tree have begun to become intertwined with modern Western conceptions of creativity.

Christianity [0-Late 17th Centuries]

Creativity as the domain of the divine - an expression of God’s will – dominated philosophical and religious thinking leading up to and throughout the Renaissance period (Weihua & Sternberg, 2006; Dacey, 1999; Knellerm, 1995, as cited in Finke et al., 1996). Artists of this time were considered lower class citizens, inferior in status to that of “butchers and silversmiths” and the like (Sawyer, 2006, p. 12). However, it was during the Renaissance period that the status of artists began to change as they became recognised for their genius by the aristocracy who began to notice, and value, artists and their work (Dacey, 1999; Sawyer, 2006). Creativity was no longer associated with skills in imitation of the masters of painting, for example. People such as da Vinci and Vasari compelled others to understand that genius “incorporated originality - [an argument which] did not become widely accepted until the late Renaissance” (Lange-Eichbaum, 1932, as cited in Sawyer, p. 13). This newfound understanding of originality brought with it a renewed notion that creativity was not specific to artists, but included professions such as architects, scientists, educators who were beginning to be appreciated for their creative resources. Creativity as a divine capacity was beginning to be questioned and humanistic belief that individuals

are responsible for what happens to them was becoming more widely held (Dacey, p. 315). The intellectual and spiritual revolution known as the Renaissance had begun and heralded one of the greatest ages of human cultural development. These developments extended the branches of the creativity-research-history-tree and links between creativity and thinking began to be explored.

The Enlightenment [Mid-17th to Late-18th Centuries]

It was during this period, The Enlightenment, that the first significant research into creative processes was undertaken: William Duff, in 1797, explored the qualities of original genius. Duff distinguished genius from talent, and his work was significant in that it highlighted the role that social influences play in creativity (Dacey, 1999). Duff argued that a combination of three key attributes was the key to genius: imagination, judgment, and taste (Dacey). Further explorations began into imagination, and theorists such as Hobbs and Duff identified imagination as a key component of human cognition; they perceived imagination as an attribute of genius (Albert & Runco, 1999; Dacey). This work was significant in delineating the distinction between talent and genius, the focus of much future research (Dacey). Albert and Runco note that the many debates that were had throughout the 18th century highlighted four important distinctions which laid the foundations for current creativity research. Firstly, genius was divorced from the supernatural; this was a time where synergies between Western and Eastern constructs of creativity started to become apparent. Secondly, genius, while certainly considered exceptional, was now perceived as a potential of every individual. The third foundational idea was that talent and genius were different; each a distinct human attribute warranting study in its own right. Finally, it was realised that the potential and exercise of the distinguishable concepts of talent and genius greatly depended on the political atmosphere at a given time. It was many years however, before this last distinction was recognised (Albert & Runco). By the turn of the 19th century the thinking around creativity began to branch out even further with researchers from vast fields of expertise, including psychology and education, now exploring creativity through the specific lens of their particular field of expertise and interest.

The Industrial Age [19th Century]

It was during the 19th century that creativity was recognised as an independent topic of study (Dacey, 1999) but not until the end of the 19th century that it was given serious attention (Albert & Runco, 1999). Albert & Runco assert that it was the arrival of Darwinism in the late 18th century and the work of theorists such as Darwin's cousin, Francis Galton, that inspired curiosity around individual difference, and by extension, creativity. Much of Galton's work from the 1860s onward focused on heredity and human ability, and incorporated his endeavours to improve the human race through breeding and other influences, a focus on the heritability of intelligence

and as such, genius/creativity (Becker, 1995, as cited in Kaufman, 2009; Runco & Albert, 2010). Perhaps the most notable of Galton's findings was the notion of "free association". Galton believed that "ideas in the conscious mind are linked to those in the unconscious mind by threads of similarity" (1879, as cited in Dacey, p. 318). It was from this point in time that creativity research began to once again branch out: researchers began to place greater emphasis on psychological studies and less on religious perspectives. With this emphasis on psychology and cognitive science came the development of models that explained and eventually led to measuring creative thought and capacity.

20th Century: A Time to Take Notice the First 50 Years...

Soon after the turn of the 20th century pioneering theorist Graham Wallas, while rejecting the popular work of Galton that applied Darwinism to social sciences, was inspired by the public reflections and discussion of mathematicians and scientists such as Von Helmholtz and Poincare on the topic of the creative process and its significance in problem solving. It became apparent to Wallas, and others working in the area, that creativity and creative thought processes may be measurable and therefore, systems of measurement began to be devised. Wallas developed one of the first models of the creative thought process as outlined in his seminal text *Art of Thought* (1926). The original model contained four stages of creative thinking. Firstly, *Preparation* whereby an individual undertakes preparatory work in focusing on a problem such as assessing the scope of the problem, assessing a desire to solve the problem and selecting and using suitable problem-solving tools from an appropriate field of study. Stage two involves *Incubation* whereby an individual disengages from the creative process allowing the problem to be internalised; Wallas (1926) believed that taking a break from the creative objective stimulated thought. The third stage, *Illumination*, involves the discovery of the idea; according to Wallas, illumination is characterised by an idea bursting forth into conscious awareness. Finally, *Verification*, as the title implies, involves the successful verification, elaboration and application of the idea. Variations and adaptations of Wallas' model can be found in the significant psychological research of subsequent decades including the addition of a fifth or sub-stage, *Intimation* whereby the creative individual senses that a solution is imminent. Wallas' model of the creative thought process is significant because it began a new branch of the creativity-research-history-tree. With this development came the realisation that if the creative thought process can be explained, it can be understood as a process that can be taught and in turn, applied. In this sense the implications for future educators were, and remain, significant.

Not all research on creativity was given as much attention as Wallas' work during the early 20th century. Chassell's work in the area is rarely cited yet it pre-dates by many decades the work of later pioneers (1916, as cited in Kaufman, 2009). Chassell created and/or modified twelve different measures of originality. Some of these tests focussed on problem-solving while others measured high-level intellectual

ability. Chassell developed 'novel situation tests' whereby participants' responses to questions were graded for originality (Kaufman, p. 11). Some of these tests are remarkably similar to assessments used a century later by leading psychologists in the field. Also noteworthy in hindsight while overlooked at the time, the London School of Psychology had instigated psychometric studies of creativity as early as 1927 with the work of H. L. Hargreaves in the Faculty of Imagination (Kaufman). Statistical analysis led to the recognition of creativity (as measurable) as a separate aspect of human cognition from IQ-type intelligence, with which it had previously been included (Albert & Runco, 1999). Finally, a fact that is often overshadowed by the growth in significance in the study of creativity itself is the moment when the term 'creativity' was coined. Alfred North Whitehead (a leading mathematician/philosopher of the era) first used the term during his Gifford Lecture in 1927 at the University of Edinburgh (Kaufman). While the work of Chassell, Hargreaves, Whitehead, Wallas and others was very slowly gaining momentum and beginning to attract the attention of pockets of researchers around the globe, it was still true that during the early 20th Century, less than 2% of all entries of psychology abstracts focused on creativity (Guilford, 1950, as cited in Kaufman). It was not until the 1950 American Psychological Association convention that one man caused the western world to begin to focus much more closely on creativity as a field of research.

1950s-1960s

By the 1950s, psychology had emerged as the main domain in which creativity was explored. A pivotal point in the history of creativity research was the seminal address to the American Psychological Association convention in 1950 by the then Association President, Joy Paul Guilford (1897-1987) (Albert & Runco, 1999; Csikszentmihalyi, 1988; Dacey, 1999; Kaufman, 2009; Runco & Albert, 2010; Weihua & Sternberg, 2006). Drawing on his research on the structure of intellect, Guilford recognised the imperative nature of future research in the field of creativity (drawing into significance creativity in its own right as a topic) and appealed to a field of psychological, educational and scientific researchers to grant creativity the scholarly attention it deserved and yet up until that time, lacked (Guilford, 1950). Guilford's appeal to the field brought about a gain in the popularity of creativity research, and an increased scientific focus on conceptualising creativity; Guilford had "helped move the field forward" (Kaufman, p. 11). Widely considered a pioneer of the field of creativity, Guilford's impact on this area of research was significant and his history as an educator (1915-1919), army private (1918-1919), Director of the University of Nebraska Psychological Clinic (1919-1921), Chief of the Psychological Research Unit at the U.S. Army Air Forces Training Command Headquarters, and string of instructional and/or professional roles at various universities, helped him gain credibility in the field as well as insight into creativity commensurate with his areas of specialisation.

Guilford's early work centred in experimental psychology and in quantitative methods which led to the first of his many notable publications *Psychometric Methods* in 1936. Guilford had a growing interest in individual differences and this became a research focus for the latter half of his professional career (Michael, 1999, p. 787). Guilford believed that intelligence was "a composite of many different abilities, many of which were relatively independent of one another" (Kaufman, 2009, p. 11). From his research into the factors of intelligence he published widely on what was to become known by 1955 as his Structure of Intellect (SOI) theory. He initially hypothesised 90 discrete intellectual abilities and 30 behavioural abilities, and by 1987 - shortly before his death - expanded this to 180 hypothetical abilities, some of which he later related to creativity: associational fluency, expressional fluency, ideational fluency, flexibility factors requiring convergent production; flexibility factors requiring divergent production, sensitivity to problems, elaboration, and originality (Kaufman, 2009; Michael, 1999; Plucker, 2007). In brief, in his SOI model Guilford organised all human cognition into three dimensions: operations (thought processes), content (subject matter) and product (the potential products resulting from varied kinds of thinking in different kinds of subject matters) (Kaufman, 2009, p. 12).

It is the distinction between 'convergent' and 'divergent' thinking, as coined by Guilford, which he found of interest – particularly in relation to creative cognition – with divergent thinking noted as a characteristic of "the flexible nature of creative thought" (Finke et al., 1996, p. 10). This led him to devise various tests designed to distinguish the two and in particular, to assess divergent thinking which he favoured as the basis of creativity (Sternberg, 2006). In this sense, he is considered a pioneer of the formal psychometric measurement of creativity (Kaufman, 2009, p. 11). To clarify, convergent thinking generally means the ability to give the correct answer to a standard question that does not otherwise require creative thinking. Convergent thinking involves a process of logical steps to organise or structure an answer. Many tasks utilised in schools, such as multiple choice tests of intelligence, encourage convergent thinking. Conversely, divergent thinking involves a thought process/method used to generate creative ideas by exploring many possible solutions. Often, and pleasingly, unexpected connections are drawn. It is Guilford's dimensions of thinking that most contemporary tests of creativity attempt to measure (Csikszentmihalyi, 1988). Testing of creative thought processes is perceived in many fields as significant in terms of understanding, education and application. Guilford's work has "led to considerable interest in identifying cognitive styles that promote creative thinking" (Finke et al., 1996, p. 10) and continues to influence the work of leading researchers in the field (Kaufman, 2009, p. 11). As Kaufman suggests, Guilford may not have solely been responsible for attracting interest to the field of creativity; however, he certainly did contribute significantly to launching its scientific study. From there, the work of E. Paul Torrance served as creativity's "beloved international champion" (Kaufman, p. 17).

Torrance, also regarded a pioneer of creativity research, built on Guilford's work albeit with more of a product focus than Guilford. Torrance developed the Torrance Test of Creative Talent (TTCT); a simple test of divergent thinking and other problem solving skills. In the TTCT participants are scored on Guilford's components of divergent thinking, *fluency*, *originality* and *elaboration*. Briefly explained, *fluency* measures how many different ideas an individual can develop in answering one question, regardless of practicality. *Originality* is, as the name suggests, about producing unique ideas. Finally, *elaboration* involves the ability to adapt the ideas that have emerged from fluency and originality (Kaufman, 2009). Like most models and tests of thinking, many adaptations have been developed over the past sixty years, and they continue to be developed and implemented for a variety of purposes. However, more recent years have seen a steady increase in criticisms of the TTCT with the "most damning criticism... the question of whether a test of divergent thinking can measure all creativity" (Kaufman, 2009, p. 17). Similarly, it was toward the 1970s that J. P. Guilford's work also came into question by some sectors of the field and "rather than usher in a new era of super sophisticated assessment, the quest for creativity tests turned out to be something of a fiasco" (Wallach, 1971, as cited in Feldman et al., 1994). Research resources, including vital military funding, were withdrawn and the field began to reconsider its objectives. According to Feldman et al. the antiestablishment phase of the 1960s influenced how the field was perceived at the time. This was to prove significant in the work conducted in this field in the 1970s and beyond.

1970s Onward

From the 1970s until the present day there has been an explosion of interest and research in the field of creativity much of which has been sparked by both the work and criticism of Guilford and Torrance. The branches of the creativity-research-tree are far reaching and the multi-directions and expert perspectives on the topic are equally diverse. This era sees the branches reaching across notions of creativity within the field of the Arts, education, psychology and others. Notable during this era is the work undertaken in the field of psychology where creativity is now viewed as an intelligence. This era is significantly influenced by the work of educators and psychologists such as Robert Sternberg and Todd Lubart who together developed their Investment Theory (Sternberg, 2006). Thinking about creativity was changing direction again. In brief, Investment Theory claims that creativity requires a convergence of "six distinct but interrelated resources" (p. 88) namely: intellectual abilities, knowledge, styles of thinking, personality, motivation and environment (Sternberg). However, according to Investment Theory, creativity is a decision, and having one or more of these six interrelated resources is not enough on its own. Rather, in order to engage in the creative process, the individual must first make a conscious decision to actually utilise specific resources (Sternberg). Like Guilford and Torrance before him, Sternberg has found that these creative resources can be

measured separately from analytical and practical skills. As such, he developed the Sternberg Triarchic Abilities Test which has provided data for much of his recent research in the field (Sternberg). Other prominent researches from this lively era in creativity research include Howard Gardner and his work on intelligence, Mihaly Csikszentmihalyi who has explored creativity in light of personality traits, Robinson and Buzan who individually argue that schools squash creativity, and the views, studies and discoveries of people such as Amabile, Finke, Ward, Smith, Feldman, Dacey, Plucker, Albert, Runco, Kaufman, Simonton, Weisberg, and Gruber (as cited in Csikszentmihalyi, 1988).

CONCLUSION

There is considerable work still to be done in reviewing the far reaching branches of contemporary creativity research and completing the metaphoric creativity-research-history-tree that will inform and shape my doctoral and other studies. Some of the key moments in creativity research, from the teachings of Plato and Aristotle, through the rise of Christianity; the Enlightenment through the Industrial Age and to the seminal moment when Guilford caught the world's attention and sparked an increased interest in creativity as a researchable concept, have provided the historical context upon which a broad body of knowledge has evolved. This knowledge continues to inform contemporary educational thinking. Teacher understanding of the concept of creativity in relation to the educational context is vital to enhance learning and teaching practices which are aimed at preparing effective thinkers, innovators and problem solvers of the future (ACARA, 2010). Developing this broad understanding of the creativity research will enable me to develop a study that will effectively explore pre-service teacher's insights into their own creativity in preparing for the profession, and how those insights impact upon their developing classroom practice. Ultimately, it is hoped that this doctoral research will contribute to understandings of pre-service teacher preparation for constructing creative learning and teaching environments.

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LYNDA KIDD

BEGINNING TEACHERS' MATHEMATICAL TEACHER-EFFICACY CONFIDENCE

A teacher's belief in his/her ability to have a positive effect on student learning is described as teacher-efficacy (Ashton, 1985). Teacher-efficacy is often described in general terms (Bandura, 1997), yet is ill-defined in relation to teachers' confidence in teaching of specific content areas such as mathematics. Factors that influence teacher efficacy are bound in the experiences gained in schools, which include their entry into the teaching profession. Other factors also include interaction among colleagues and the broader education community as well as their confidence to manage student learning within complex school environments. This is particularly relevant for beginning teachers as early experiences impact on their teacher-efficacy, which once established is resistant to change (Tschannen-Moran & Hoy, 2007). The study reported in this chapter focuses on the types of early teaching experiences gained by beginning teachers, their mathematical teacher-efficacy confidence (MTEC) and the changes that occurred in their MTEC as they embarked on new careers.

BACKGROUND

Over the last two decades, there has been strong growth in the number of casual employees in Australia (Australian Bureau of Statistics [ABS], 2009). In 2006, fixed-term contracts increased to five per cent of all employees and were predominant for professionals and workers with higher education qualifications such as teachers (ABS, 2010). This suggests that employment trends are moving away from a permanent teacher workforce towards less secure short term employment arrangements (Harris, Jenz, & Baldwin, 2005; Skilbeck & Connell, 2003). In 2004, casual employment in the education sector was 17%; however, this figure included staff other than teachers (ABS, 2006).

In Tasmania, high rates of casual and contracted positions were also reported. The Department of Education, Tasmania (DoET) (2009) noted that 10% of state government teachers were employed on fixed-term contracts. The opportunity for beginning teachers to gain full-time permanent teaching positions in Tasmania is limited, with many beginning teachers starting their careers in contracted positions or employed on a casual basis as relief teachers. In the first half of 2009, only 61 permanent beginning level teacher positions were available in Tasmanian government schools (DoET, 2009). This entry level would apply to graduating

beginning teachers starting their teaching career and other teachers who have not yet gained a permanent position. Hence, beginning teachers who graduated that year would have been employed in non-permanent positions, such as fixed-term contracts or as relief teachers. It is, therefore, pertinent to determine the impact this changing employment landscape has on beginning teachers' confidence in teaching mathematics.

LITERATURE REVIEW

Teacher-efficacy

Teacher-efficacy is based on Bandura's (1993) self-efficacy theory that states "people's beliefs about their capabilities to exercise control over their own level of functioning and over events that affect their lives...[can] influence how people feel, think, motivate themselves, and behave" (p. 118). Self-efficacy is therefore one's own judgment of personal capabilities. Consequently, teacher-efficacy is a teacher's "beliefs in their ability to have a positive effect on student learning" (Ashton, 1985, p. 142). Woolfolk and Margetts (2007) showed that teachers with a high sense of teacher-efficacy are more likely to work harder and persist longer, even when confronted with difficult students, as they believe in themselves.

Four factors have been identified as having an effect on self-efficacy and therefore teacher-efficacy. These are mastery experiences, physiological and emotional states, vicarious experiences, and social persuasion (Bandura, 1997). Mastery experiences refer to having successful teaching experiences that assist in the establishment of teacher pedagogy. Hoy and Spero (2005) noted that the perception of a successful performance raises teacher-efficacy.

The physiological and emotional state refers to the level of emotions experienced by teachers. These contribute to their sense of success or failure. If the success is attributed to an external cause such as student ability, teacher-efficacy will increase at a slower rate than if it is attributed to an internal cause, such as personal ability or effort (Tschannen-Moran, 2007; Woolfolk & Margetts, 2007).

Vicarious experience is gained by observing successful teachers teach. This involves the observer imagining that they are participating in the experience of the other teacher. The more the observing teacher identifies with the person demonstrating the skill, the stronger the impact will be on the observing teacher's teacher-efficacy (Hoy, 2000; Woolfolk & Margetts, 2007).

The final factor highlighted by Bandura (1997) is the effect of social persuasion. This is received through feedback and support provided by colleagues and the broader education community. The impact social persuasion has on teacher-efficacy depends on the credibility, trustworthiness and expertise of the person providing the feedback. Social persuasion has limited influence over increases in teacher-efficacy that are enduring and sustainable over time (Hoy, 2000; Hoy & Spero, 2005; Woolfolk & Margetts, 2007).

Teacher-efficacy is believed to be most malleable in the early learning stages of a teacher's career but once established is resistant to change (Tschannen-Moran & Hoy, 2007). Hoy (2000) found that teacher-efficacy appeared to increase during education studies but then declined during Professional Experiences when the pre-service teacher was confronted with the reality of teaching. Hoy (2000) also found that the level of support given to the pre-service teachers correlated with changes in teacher-efficacy. Research on teacher-efficacy, however, does not state whether teacher-efficacy levels increase again once the pre-service teacher gains further mastery teaching experiences and skills when they begin teaching independently.

Tschannen-Moran and Hoy (2007) conducted a study that compared the teacher-efficacy of experienced teachers (with four or more years of experience) and beginning teachers (with up to three years of teaching). The results from their study showed that demographic variables such as gender, age and school setting did not have an effect on teacher-efficacy. The availability of resources (categorised as social persuasion) was found to contribute to changes in teacher-efficacy for beginning teachers but not for experienced teachers. Verbal (or social) persuasion in the form of support from parents and the community had an influence on experienced teacher's teacher-efficacy whereas support from colleagues and the community were contributing factors for beginning teachers. Tschannen-Moran and Hoy found that mastery experiences had less effect than other aspects of teacher-efficacy for beginning teachers in their study.

Research into teacher-efficacy in relation to specific content areas is limited. A study that focused on the delivery of a professional development program, explored the participating teachers' confidence in their ability to teach mathematics (Beswick, Watson & Brown, 2006). For their study, Beswick et al. developed a comprehensive teacher profiling instrument that included questions about use of resources, teaching strategies, and confidence in their ability to teach mathematics content. The teachers in the study expressed confidence in their mathematical knowledge but not in their ability to teach mathematics. In this chapter, the beginning teachers' confidence in their ability to teach mathematics is described as Mathematical Teacher-efficacy Confidence (MTEC).

Early Teaching Experience

As discussed earlier, the increase in casual employment in the teaching profession means early teaching experiences currently include a range of permanent and non-permanent employment experiences. A study by Fraser, Draper, and Taylor (1998) revealed that teachers with non-permanent teaching positions in the early stages of their teaching career, experienced limited opportunities to build relationships with staff and children. Fraser et al. recognise that social relationships amongst colleague teachers are a "highly prized facet of the job" (p. 70) and suggest that those relationships create a support system that help to reduce stress and the feeling of isolation.

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Another study of relief teachers (Duggleby & Badali, 2007) confirmed the difficulty teachers experience in establishing relationships with colleague teachers, students, and senior staff. The non-permanent teachers felt isolated from peers and were excluded from workshops and professional development sessions as they were often employed as replacement teachers so that the regular teachers could attend those sessions. They were also unable to build the rapport with students required for effective behavioural management. The findings from the Duggleby and Badali study also revealed further negative aspects of relief teaching such as the challenges of trying to improve one's own teaching pedagogy with limited classroom ownership and being constantly tested by students in the classroom. This suggests that part-time and fixed-term teaching positions limit the beginning teachers' access to positive experiences that would contribute to increases in teacher-efficacy.

METHODOLOGY

The four factors of teacher efficacy proposed by Bandura (1997) are related to teaching practice in general, and are not specific to any particular teaching specialisation, such as Mathematics. In order to investigate beginning teachers' MTEC as they transition from study into employment, it was necessary to select a methodology that could identify if change was evident and then describe the factors that impacted on changes identified. To achieve these aims a longitudinal mixed-methods approach was chosen. It allowed for the collection of quantitative and qualitative data as "no one kind or source of evidence is likely to be sufficient (or sufficiently valid) on its own" (Gillham, 2000, p. 2). Questionnaires were chosen to collect quantitative data quickly from a broad range of beginning teachers whilst interviews were used to gain in-depth qualitative data. The purpose of the interviews was to give the beginning teachers a voice and allow them to a personal contribution to an understanding of teaching practices (Kvale, 1996)

To accommodate the aim of analysing the change in teacher confidence over a period of time it was important that the research design allowed for data to be collected at two different points in time: a) before the beginning teachers began their teaching careers to establish base line data and b) after one year of teaching for evidence of any changes that may have occurred. Therefore, a questionnaire was completed at the beginning of the study and interviews were conducted after teaching experience had begun. The teachers with one complete year of teaching experience at the time of the interview were invited to complete the questionnaire a second time for MTEC comparisons.

The participants in the study were a sample of opportunity (Creswell, 2012). Pre-service teachers (henceforth referred to as beginning teachers) who attended their final lecture in their education degree at the Faculty of Education, University of Tasmania in 2008 were invited to participate. There were approximately 200 people in the target population, however only 16 chose to participate. The low number of

responses could have been due to the timing of the distribution of the questionnaires. Just prior to the request for volunteers, the pre-service teacher cohort had completed student evaluation questionnaires for their units of study. Participation in the study was voluntary. As one of the 16 beginning teachers who responded did not graduate that person's response was not included in the study.

The questionnaires gathered demographic data and included questioning about the beginning teachers' qualifications and the type of employment they desired. The status of employment was categorised using the employment statuses available in the Department of Education, Tasmania (DoET) (2005). These included *Full-time*, *Part-time*, *Fixed-term Contract*, and *Relief*. The beginning teachers were asked to number their options in order of preference.

The questionnaire also included twelve Likert items from the Beswick et al., (2006) teacher profile instrument. Permission to use these items from the teacher profile instrument was granted by the authors. Beginning teachers were asked to mark their level of confidence on a scale from low confidence to high confidence in their ability to develop their students' understanding of twelve mathematical concepts, such as measurement and percentages. Their responses to these questions were used as a measure of their Mathematical Teacher-*efficacy Confidence* (MTEC).

Of the 15 beginning teachers who completed the questionnaire, eight chose to participate in individual semi-structured interviews to provide details of the type of employment they gained and their first year teaching experiences. The responses from the original questionnaires helped inform the questions for the interviews with the option to digress throughout the interview allowing for personal stories to emerge (Kvale, 1996). Information on the type of support they received and what helped or hindered their teacher-*efficacy confidence* as beginning teachers was also gathered. The interviews were conducted after the teachers had gained at least four months of experience.

The audio recordings from the interviews were transcribed verbatim and coded according to the four factors of teacher-*efficacy* proposed by Bandura (1997). Of the eight interviewees, five were interviewed after one full year of working as a teacher. It was these five beginning teachers whose MTEC scores were compared against their original responses. In reporting the results from the questionnaires and the interviews, pseudonyms are used to ensure the anonymity of the beginning teachers involved.

RESULTS

There were 15 beginning teachers who participated in this study; eight of whom were interviewed after at least four months with five of these completing the second MTEC Likert items for comparison. Not all of the beginning teachers completed all the questions in the questionnaire or interviews therefore participant numbers will be clarified in each of the result sections.

Preferred Status of Employment

The results from the questionnaire were analysed using descriptive statistics. There were 14 beginning teachers who listed their preferred status of employment. Table 1 shows that they all preferred *Full-time* employment with nine (64%) nominating it as their first preference and only one nominating it as their last. *Fixed-term* employment was considered by 12 (86%) beginning teachers, however, none of them elected this as their first preference. *Relief teaching* was selected by 12 (86%) beginning teachers but was less desirable than the other employment statuses as the majority (67%) recorded it as a last preference. None of the beginning teachers listed relief teaching as a first or second preference. As the beginning teachers were asked to number all the options that related to them in order of preference, it can be construed that some of them were prepared not to accept teaching positions that were part-time 3 (20%), fixed-term 2 (13%), or relief 2 (13%).

Table 1. Beginning teachers' preferred status of employment

<i>Employment status</i>	<i>Preference number</i>				<i>Ticked</i>	<i>Total*</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>		
Full-time	9	2	0	1	2	14
Part-time	3	6	0	1	1	11
Fixed-term	0	3	8	0	1	12
Relief	0	0	2	8	2	12

*(n = 14)

Employment Gained

During the interviews seven beginning teachers provided information about the actual employment they gained. Although an online search was conducted through the state government's directory for the names of the other beginning teachers who completed the original questionnaire, none of them were listed. This suggests that, at that time, they were not employed in Tasmanian government schools as either permanent staff or on fixed-term contracts.

Although six (86%) of the seven interviewees indicated that they desired and obtained full-time positions, they indicated that these positions were not necessarily easy to obtain. For instance, two of the full-time teaching positions were offered with only two days' notice before the commencement of the school year. Other full-time positions were gained after part-time and relief teaching. The full-time and part-time positions gained by the beginning teachers in their beginning years were not necessarily permanent positions. In fact, only two out of six (33%) interviewees stated that their employment status was permanent and these were both in non-government schools.

Entering the teaching profession was different for all the beginning teachers. Alex gained a full-time non-permanent teaching position at the same school he completed his last two Professional Experience practicums, conducted his Honours project, and tutored students in third term of the previous year. In contrast, Robyn only gained two fixed-term contracts within the first year; one for five weeks full-time and the other for 16 weeks part-time teaching.

Mathematical Teacher-efficacy Confidence

Beginning teachers' confidence in their ability to develop their students' understanding of specific mathematical concepts has been referred to in this study as mathematical teaching-efficacy confidence (MTEC). The Likert items in the questionnaire related to the beginning teachers MTEC. Scores were assigned to the MTEC items and ranged from 1 for low confidence to 5 for high confidence. Upon graduation, the 15 beginning teachers were overall fairly confident in their ability to develop an understanding in the mathematical concepts of *Measurement* ($M = 4.0, SD = 1.36$), *Chance and Data* ($M = 3.86, SD = 1.17$), *Space* ($M = 3.71, SD = 1.20$) and *Mental Computation* ($M = 3.71, SD = 1.07$). They were less confident, however, in the other eight concepts in particular *Ratio and Proportion* ($M = 2.71, SD = 1.38$). Confidence in teaching *Percentages* and *Pattern and Algebra* were also found to be low.

Change in MTEC

There were five out of eight interviewees who completed the teacher confidence items at the end of their education degree (*On Graduation*) and after one year of teaching (*After Teaching*). The median and mean were analysed to consider any changes and are listed in [Table 2](#). One of the interviewees did not respond to two of the statements after teaching and therefore the corresponding responses were removed from the previous results to keep the sample size the same.

Table 2. Change in MTEC in specific mathematical concepts of five interviewees

<i>Mathematical Topic</i>	<i>Mathematical teaching-efficacy confidence</i>					
	<i>On graduation</i>			<i>After teaching</i>		
	<i>Mdn</i>	<i>M</i>	<i>SD</i>	<i>Mdn</i>	<i>M</i>	<i>SD</i>
Measurement	5.00	4.80	0.84	4.00	4.20	0.84
Space	4.00	4.00	0.71	4.00	3.80	1.10
Chance and Data	4.00	4.00	0.71	5.00	4.80	0.45
Mental Computation	4.00	3.80	0.84	4.00	4.20	0.45
Critical Numeracy in Media	4.00	3.75	1.26	4.00	3.80	1.30
Percentage	3.50	3.50	1.29	2.75	2.90	1.65

(Continued)

Table 2. (Continued)

Mathematical Topic	Mathematical teaching-efficacy confidence					
	On graduation			After teaching		
	Mdn	M	SD	Mdn	M	SD
Decimals	3.00	3.60	1.52	3.00	3.10	1.52
Connecting Mathematics to Key Learning Areas	3.00	3.40	0.55	3.00	3.00	1.22
Assessment	3.00	3.20	0.84	3.00	3.20	1.30
Pattern and Algebra	3.00	2.80	0.84	4.00	3.80	0.45
Ratio and Proportion	2.50	2.75	1.71	2.00	2.25	1.50
Fractions	2.00	2.60	1.34	3.00	2.90	1.52

Note 1. ($n = 5$) except for *Percentage* ($n = 4$), and *Ratio and Proportion* ($n = 4$)

Note 2. Maximum mean and median score = 5.

The major changes in MTEC occurred in *Measurement*, *Percentages*, *Chance and Data*, and *Pattern and Algebra*. The greatest decrease in MTEC was in *Measurement* (from $M = 4.8$, $SD = 0.84$, to $M = 4.2$, $SD = 0.84$). Although the mean for *Measurement* decreased, it was the highest score on graduation and it remained higher than nine of the other concepts (75%) after one year of teaching. *Percentages* also showed a decrease in MTEC (from $Mdn = 3.5$, $M = 3.50$, $SD = 1.29$, to $Mdn = 2.75$, $M = 2.90$, $SD = 1.65$). All four of the interviewees who responded to MTEC in *Percentages* recorded a slight change. Alex increased his score from 4 to 5 and the other three decreased their ratings by a score of one.

The concept that showed the main increase in MTEC was *Pattern and Algebra* (from $Mdn = 3$, $M = 2.80$, $SD = 0.84$ to $Mdn = 4$, $M = 3.80$, $SD = 0.35$). Angela increased her score from 2 to 4 whilst three other interviewees increased their MTEC in pattern and algebra by one point. *Chance and Data* was another concept in which the MTEC increased considerably (from $Mdn = 4$, $M = 4.00$, $SD = 0.71$, to $Mdn = 5$, $M = 4.8$, $SD = 0.45$). Alex had an increase in MTEC in *Chance and Data* from 3 to 5 whilst Robyn and Emily both increased from 4 to 5.

Assessment was the only mathematical concept in which the MTEC remained stable ($Mdn = 3$, $M = 3.4$ at both stages) with only the standard deviation changing from 0.84 to 1.30. Although MTEC for assessment was stable, three out of the five (60%) interviewees had a considerable change in their MTEC in *Assessment*. For instance, Angela and Robyn both decreased their MTEC score in this concept from 4 to 2, whilst Emily increased hers from 3 to 5 hence the larger standard deviation.

Individually, Alex was the most confident and had the greatest improvement in his ability to develop an understanding of the specified mathematical concepts with his students as shown in Figure 1. His changes in MTEC involved an increase in 10 out of the 12 mathematical concepts with two of these concepts (*Chance and*

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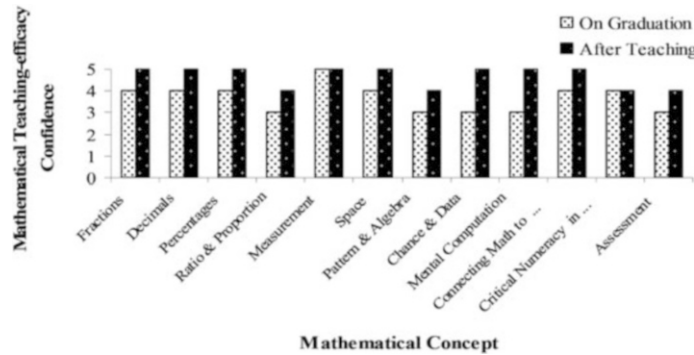


Figure 1. MTEC scores of Alex in the specified mathematical concepts on graduation and after one year of teaching.

Data and Mental Computation) increasing by two points. He rated himself as very confident (5 out of 5) in 8 of the 12 mathematical concepts listed with the other four concepts being rated as 4 out of 5.

Robyn, who gained limited teaching experience in primary schools, experienced the greatest decrease in MTEC. She rated herself as very confident (5 out of 5) in four of the mathematical concepts on graduation but only in two of the concepts after the first year of teaching as shown in Figure 2.

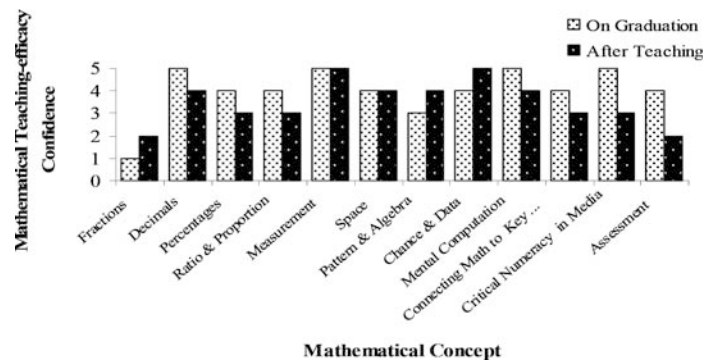


Figure 2. MTEC scores of Robyn in the specified mathematical concepts on graduation and after one year of teaching.

Four Factors of Teacher-efficacy

The data from the eight interviews were analysed looking for trends that occurred and then re-conceptualised into the four factors of teacher-efficacy. The interviewees felt they were lacking in mastery experiences ($n = 7, 88\%$) but they considered

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reflective practices ($n = 2$, 25%), a strong knowledge base in subject content ($n = 3$, 38%), and classroom procedures as important. Alex, who had a very stable start to his teaching career, stated he was able to build a strong rapport with the students and gain mastery experiences whilst Robyn, having only two short-term contracts, had limited access to mastery or vicarious experiences. Vicarious experiences, in the form of observing colleague teachers during Professional Experiences (PE), were stated as being very valuable by two of the interviewees. Having the opportunity to spend extra time observing teachers teach was a great benefit especially to Alex who estimated he spent double the normal time in classrooms whilst undertaking his Honours project. He commented,

I definitely saw things in the classrooms while I was doing research that I would go “that was really great” - and I have done those things - and I saw things happening that I thought “make sure I don’t do that.”

Stress (physiological and emotional aspects) was one aspect that was found to impact negatively on half ($n = 4$) of the interviewees’ teacher confidence. Mervyn highlighted this issue when he stated,

I am always on high alert and didn’t switch off very often. This continued over the whole of the Christmas holidays where I lost a lot of sleep and continued to think about how to improve in my second year.

Student rapport had both positive ($n = 3$, 38%) and negative ($n = 1$, 13%) impacts on the emotional aspects of teaching. Behavioural management issues impacted on teacher confidence negatively as evidenced in the following quote from Greg’s interview.

I know I can teach but it is very difficult when so much time is spent on trying to keep difficult kids in the classroom and juggling their range of management issues.

Four of the beginning teachers commented on the support that they received from principals, and staff (social persuasion). Alex’s principal, for example, supported him trialling different teaching strategies. Resources were also important to five of the eight (63%) interviewees. Mervyn indicated that his confidence in teaching mathematics improved when he started to plan and share resources with another teacher who was teaching the same year level.

DISCUSSION

As discussed in the introduction, research (see Harris et al., 2005; Skilbeck & Connell, 2003) shows that casual and fixed-term employment has been increasing over the past two decades (ABS, 2010). The majority of the beginning teachers in this study were eager to be employed in full-time teaching positions. However, some of them were required to begin their teaching career through relief teaching,

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fixed-term employment, or in positions other than teaching with others gaining full-time teaching positions only two days before the school year commenced. By the end of the year, the majority ($n = 5$, 71%) were employed in fixed-term, full-time teaching positions although only two of these positions were permanent. This rate of non-permanent employment is more than twice the 30% reported by ABS (2010).

Overall, the change in MTEC was minimal. The lack of major change may imply that beginning teachers' teacher-efficacy was established when entering the teaching profession and therefore resistant to change, as suggested by Bandura (1993). However, some concepts increased whilst other decreased and the change in individual's MTEC also varied. Alex, who gained the most stable entry into teaching, experienced the greatest increase in teacher confidence. His interview indicated that the beginning of his teaching career provided him with access to the four factors that influence teacher-efficacy proposed by Bandura (1997). Alex received verbal support from the principal (social persuasion); tutored students in classes outside his field of study (mastery experience); observations of other teachers involved in his research project (vicarious experience); and through positive interaction with students (psychological and emotional).

Robyn had the least teaching experience of any of the interviewees and was shown to have the greatest decline in MTEC. Having fewer and less stable early teaching experiences than the other beginning teachers potentially limited Robyn's opportunities to receive verbal support for social persuasion, to perform mastery experiences, or obtain access to vicarious experiences. Teaching in non-permanent teaching positions in the early stages of the teaching career limits opportunities to build relationships with staff and children and these relationships are important to create a support system for gathering resources and feedback (Fraser et al., 1998; Duggleby & Badali, 2007).

CONCLUSION AND RECOMMENDATIONS

For the teachers in the study, there were changes (both increases and decreases) in MTEC after teaching for one year in a third of the mathematical concepts, especially *Pattern and Algebra*. The beginning teacher with the greatest increase in MTEC had the highest MTEC on graduation, and a stable entry into the teaching profession giving him the greatest access to the four factors of teacher-efficacy (Hoy, 2000). The beginning teacher who had the least teaching experience had the greatest decline in MTEC. Although the number of participants is too small to allow for generalisation, the results from the study suggest early teaching experiences may affect beginning teachers' mathematical teaching-efficacy for specific mathematical concepts. The more stable and consistent early teaching positions are the greater and more positive the changes are likely to be. It is, however, necessary to research this further before these claims can be made with confidence.

The beginning teachers in the study expressed a *desire* for a stable entry into the teaching profession. The results suggest that they *require* a stable entry into the

teaching profession to assist them in establishing enduring MTEC. Should the current employment trends continue to offer less stable positions to beginning teachers by way of casual and fixed-term teaching positions, it is recommended that beginning teachers be better prepared during teacher practicums for the possibility of working in those less stable teaching contexts.

A longitudinal study over several years would help to give a greater understanding of how beginning teachers enter the teaching profession; how their mathematical teacher-efficacy confidence develops over the years; and the impact it has on their teaching practice. A study such as this could also incorporate establishing if there is a relationship between the development of teacher-efficacy and teaching experiences. This knowledge could then be used to help empower beginning teachers to access the resources and support needed to become more confident teachers of mathematics content.

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ELKANA NGWENYA

JUST GIVE ME A BREAK, WILL YOU? EFFECTS OF UNINTERRUPTED BREAK TIME ON TEACHERS' WORK LIVES

Time allocation is important for work, leisure, and well-being. How time is spent in schools has always been a topical issue (Perlow, 1999) and has implications for the work-time and leisure-time allocation of learners (Jones, 1934; Rosenshine & Berliner, 1978) and teachers. However, various education reforms have tended to create additional pressures on teachers' time-use (Easthope & Easthope, 2000; Roth, Brooks-Gunn, & Linver, 2003; Gardner & Williamson, 2004; Churchill & Williamson, 2004), and on teachers' work-lives. The literature on the likely impact of break time on worker productivity and worker well-being suggests a positive productivity effect of 'sufficient' break time (Bechtold, Janaro, & Sumners, 1984; Romer, 1987; Carlin, 1997; Dababneh, Swanson, & Shell, 2001). Lengthy breaks, too short breaks or too frequent breaks can affect effectiveness, efficiency and productivity (Bryson & Forth, 2007). It is paramount to have, therefore, a historically developed entitlement to uninterrupted break time (UBT). In all industries, certified agreements stipulate the minimum entitlements of meal break times and pause times. The break times have been set historically through Union negotiations and as a part of a range of legal instruments governing awards and working conditions of teachers. On key feature of the break times (be they meal or pause breaks) is that they should not be interrupted or encumbered – thus making these times quite distinct from contact time, non-contact or preparation time.

There is a dearth of empirical evidence of the impacts of break-time on worker productivity (Bunn, Stave, Downs, Alvir, & Dirani, 2006). Such a dearth is even more pronounced in cases involving the likely impact of uninterrupted break time (UBT) on teachers' time-use. Teacher's time-use inside and outside school affects teachers' workload; and, similarly, teachers' workloads influence time-use behaviours and teachers' work productivity. Teachers' work productivity has implications for outcomes of schooling, teaching, and teachers' work lives.

The allocation of teachers' time to schoolwork and non-school work involves significant trade-offs in time allocation across activities. Constraints on teacher time allocation to a myriad of activities and how teachers manage their time are influenced considerably by the pace and frequency of education reforms. These reforms alter teachers' time-use patterns, teachers' perception of roles and responsibilities, as well as changing how teachers view the types of school activities that enhance

or hinder their productivity inside and outside schools. The likely effects of the length of break time on worker productivity will differ because of cultural factors (Carlin, 1997), workplace settings (the school setting), and the life style stages of workers (the career stages of teaching and the teachers experiences in dealing with time famine (Perlow, 1999)), and how teachers particularly construct the concept of good teaching (Hargreaves, 1994).

LITERATURE REVIEW

The effects of external change on the management and administration of schools are considerable. Teachers are finding themselves not having sufficient time to teach or plan with their colleagues – and very unlikely to find a break as they will try and put children first and themselves last. Teachers are increasingly becoming unable to manage the time they are left with to address students' needs, and also to undertake their own professional development (Galton, MacBeath, Page, & Steward, 2002; Hargreaves, 1994; Yamagata-Lynch, 2003).

In shaping learning and assessing productivity in any organisation it is important to understand how time is allocated to activities that are undertaken within and/or for the organisation. It is in the context of evidence from teachers' workloads, legislated entitlements and industrial awards teachers' working conditions, and aspects of labour law that the implicit link between time allocation, UBT and productivity (effectiveness and efficiency) is made in this chapter.

The respective definitions of ordinary working day, contact time, non-contact time, preparation time, meal time, lunch break, pause break and wet-day breaks are at the core of teachers' work and time allocation models. The proportion of teachers' contact and non-contact time are reported generally in the literature on teachers' workloads. The relative weighting of contact time, non-contact time, and uninterrupted breaks in schools has been developed in order to maximise teachers' effectiveness and efficiency.

The definition of uninterrupted break time, for teachers in Australia, is captured as part of teachers' entitlements, as presented in Schedule B3 of the *Educational Services (Teachers) Award* (Fair Work Commission, 2010), referred to as Award (2010) herein. The schedule shows that

an employee will be entitled to a paid meal break of no more than 30 minutes,
and no less than 20 minutes no later than five hours after commencing work.
(Award, 2010, § B3.1)

The requirements for uninterrupted break-time in circumstances in which break is interrupted are stipulated in the Award. The Award (2010) also makes mention of shift work (Award, 2010, § B.5.1) and the amount of loading payable to teachers (Award, 2010, § B.5.2). A rate for Saturday work times is provided, but no rate is given for teachers' Sunday work. It is by implication, therefore, that Sunday teachers' work is considered outside the defined ordinary hours of work or the extended hours of work.

Apart from unencumbered break time, the teacher is entitled to adequate rest before the next day of teaching. The Award is specific about the matter of after-hours activity and requires that “an employee will be entitled to a minimum break of 10 consecutive hours between the end of one period of duty and the beginning of the next” (Award, 2010, § B.1.4). The teacher’s entitlement to non-contact time requires that

an employee responsible for programming and planning for a group of children will be entitled to a minimum of two hours per week, during which the employee is not required to teach and supervise children, or perform other duties directed by the employer for the purpose of planning, preparing, researching and programming activities. (Award, 2010, § B.3.2)

The impact of teachers’ workloads and the issue of teachers’ time famine are documented widely in the literature (Drago et al., 1999). Of the few studies on teachers’ workloads only one study (Gardner & Williamson, 2004) collected data on UBT. The Gardner and Williamson (2004) study is the first independent study of Tasmanian teachers’ workloads, and therefore the most current study on the workloads of primary school teachers in Tasmania. To the best of the researcher’s knowledge, there is no quantitative and inferential empirical (econometric) evidence on the impact of UBT on teachers’ time allocation behaviour. With the exception of Gardner and Williamson (2004) there is no other study that collected data on UBT.

THE STUDY

Teachers lament the absence of time to take an uninterrupted break time, to have lunch, and to have contact with students outside the ordinary working hours. Uninterrupted break time (UBT) is therefore used interchangeably with unencumbered break time (UBT). The concept of UBT contrasts strongly to contact time, non-contact time and preparation time. What makes the lack of UBT a significant research problem is that teachers are entitled to UBT. These minimum and maximum levels of UBT are specified explicitly in legislation, teachers’ awards, condition of service documents and advice that teachers’ unions distribute to their members. The problem of analysing the prevalence and likely impact of UBT on Tasmanian primary teachers is compounded by the absence of studies on time use patterns of Tasmanian primary school teachers. The implications of contact time, non-contact time and UBT are generally cast in qualitative sentiments on workloads of teachers (see examples, Gardner & Williamson, 2006; Wilkinson, Ingvarson, Kleinhenz, & Beavis, 2005).

This research recognises the dearth of empirical evidence relating to the impacts of uninterrupted break time (UBT) on teachers’ time use in schools and outside schools. The aim of this research, therefore, is to present estimates of the extent of the effects of UBT on teachers’ time allocation behaviour in Tasmania. The research question that is pursued is: Does the quantity of uninterrupted break time influence the time allocation behaviour of teachers? If so, how; and, if not, why not?

Data Collection

The core research hypothesis is that the quantity of uninterrupted break time influences the time allocation behaviour of teachers. It is posited that the effects of UBT occur through activity switching behaviour during the teaching week, as well as through the allocation of time to school work over the weekends. This study is based on the time diary data of the primary teachers (n = 62) from a survey of unionised Tasmanian education workers (Gardner & Williamson, 2004); these data provide both time diary and data on factors that enhance or hinder teachers' work lives in schools. Teacher demographic variables were also included, as well as variables on selected school characteristics. The types of activities teachers undertake in schools, and the time commitment allocated to these activities was also captured by the Gardner and Williamson survey instrument (2004).

The study conducted by Gardner and Williamson (2004) included part-time and full-time education workers. In this study, only full-time teachers were surveyed in order to focus attention on the effects of UBT on time allocation behaviour. This approach allowed one to measure relative time-use over the normal working week without having to account for days when teachers were absent. The emphasis was, therefore, on the effects of UBT on the time-use behaviour of a group of teachers who experience time-use in a similar way – that is, only in terms of how such time is allocated or not made available during a typical working week. As a result, the effects of breaks and weekend work have similar interpretations for this selected cohort of teachers.

Variables

The concepts and variables required for a broader but focused analysis of the impact of UBT and utilised in this study are presented in [Table 1](#). Those concepts and variables are presented in the order in which they are mentioned throughout the chapter. Brief definitions of the variables and the levels of measurement of corresponding variables are also presented in [Table 1](#).

Table 1. Definition of Time-Use Concepts, Variables and Coding (Measurement Levels)

<i>Variable</i>	<i>Concepts and Variable Definition</i>	<i>Code</i>
UBT	Uninterrupted (unencumbered) break time	1,2,3,..., n
Dmo	Monday time budgets	1,2,3,..., n
Dtu	Tuesday time budgets	1,2,3,..., n
Dwe	Wednesday time budgets	1,2,3,..., n
Dth	Thursday time budgets	1,2,3,..., n

Table 1. (Continued)

<i>Variable</i>	<i>Concepts and Variable Definition</i>	<i>Code</i>
Dfr	Friday time budgets	1,2,3,..., n
Dsu	Sunday time budgets	1,2,3,..., n
Fulltime	Full time (equivalent) employed teachers (FTE=1.0)	(0,1)
Age3	Teachers aged over 40	(0,1)
Noschs	Number of schools taught at	1,2,3,..., n
Exastr	Length of teaching experience	1,2,3,..., n
Stscl	Number of students in class	1,2,3,..., n
Location	Location of school (rural)	(0,1)
tt9	Time spent supervising students (activity # 9)	1,2,..., n
tt11	Time spent attending meetings (activity # 11)	(1,2,..., n)
tot_af	Total number of assisting factors	(1,2,..., n)
tot_hf	Total number of hindering factors	(1,2,..., n)
n_active	Number of activities undertaken by a teacher	(1,2,..., n)
dmf_s	Share of weekly time spent on Monday to Friday	n%
RMSE	Root Mean Square Error	1,2,3...
dmo_s	Share of weekly time spent on Mondays	n%
dtu_s	Share of weekly time spent on Tuesdays	n%
dwe_s	Share of weekly time spent on Wednesdays	n%
dth_s	Share of weekly time spent on Thursdays	n%
dfr_s	Share of weekly time spent on Fridays	n%
dsu_s	Share of weekly time spent on Sundays	n%

Notes: (0,1) 0=otherwise, 1=variable as defined (eg. Fulltime) 0 = Not Fulltime, 1 = Fulltime; n% is actual proportion (as the percentage calculated); and, (1,2,3,..., n) = actual count as made.

Analysis

Hypothesis testing focused on analysing the slope of the regression of time-use on UBT. The null hypothesis underlying the slope parameter is that: UBT has no effect on time-use. That is, the coefficient of UBT is not statistically different from zero. A t-test was conducted for the regression coefficient, and the t-ratio was evaluated for significance using the p-value obtained. An F-test was conducted and F-ratios are reported for the regression model. The use of the Ordinary Least Squares (OLS)

regression was considered superior to an ANOVA because the t-test in the OLS can show (i) if UBT is a significant factor, (ii) the magnitude (strength) of the effect of UBT, and (iii) the direction of the strength of the UBT factor. In addition, if the UBT coefficient is statistically significant then the variable UBT can be used as an explanatory variable in regression models that are superior to the OLS. For example, the use of Seemingly Unrelated Regressions (SUR), was used in this paper, and is an extension of the analysis of the UBT null hypothesis in OLS.

In order to estimate the effect of UBT on time use, single OLS regressions were estimated for the linear and non-linear models. The linear model showed the effect of a unit increase in the value of UBT on teachers' time-use. The non-linear model (a double logarithmic model) showed the percentage change in teachers' time-use likely to come from a one per cent change in UBT. These two interpretations of the slope coefficient of UBT are important for understanding the results reported in this paper. Only one dependent variable was considered in the OLS estimations. The intercept terms were likely to be large and statistically significant. However, In using this technique the following factors were also considered, the root mean square errors (RMSE), the R-squared values for the single factor model, the significance of the F-test for the model, among other desirable measures of robustness of an empirical model. The use of a single factor model also means that the p-values of the t-ratio and F-ratio will be identical.

The SUR estimated the coefficients of the regression model under the assumption of interdependency of time allocation decisions across days of the week. That is, daily time-use equations were estimated simultaneously without "wast[ing] the information that same set of parameters appear in all of the equations" (Greene, 1993, p. 487). The relevant equation structures developed were estimated by running STATA 10 routines (StatCorp, 2010). In SUR break time (UBT) was included as a variable explaining teacher time-use. The relationship between UBT and time-use was modelled using non-linear and linear equations.

By investigating only one variable, UBT, the impact of UBT on teacher time-use was isolated and not influenced by any significantly compounding factors. In addition, the single factor OLS model allowed for investigating the likely simultaneity or seemingly unrelatedness in the parameter estimations. Finally, the robustness of the coefficient of UBT was established by examining the sign and magnitude of the UBT effect in the presence of other confounding factors. The single equation OLS and SUR were therefore estimated such that they complemented each other. The SUR estimated the coefficients of the regression model under the assumption of interdependency of time allocation decisions across days of the week. That is, daily time-use equations were estimated simultaneously without "wast[ing] the information that same set of parameters appear in all of the equations" (Greene, 1993, p. 487). The relevant equation structures developed were estimated by running STATA 10 routines (StatCorp, 2010). The results of these estimations are reported in the [Tables 2](#) through [5](#).

RESULTS

UBT Distribution

The results reported in [Table 2](#) show the distribution of UBT experienced by Tasmanian teachers. The results are reported for 58 teachers instead of 62 because some teachers' records showed missing diary values for UBT. The lowest level of UBT was 30 minutes per week (on average, 6 minutes a day), and the largest level of weekly UBT was 4.25 hours (that is, 255 minutes, which on average is about 55 minutes a day). The median shows that 50 per cent of teachers had UBT of at most 1.5 hours (90 minutes/week or 18 minutes/day). A large proportion of teachers (74.14%) experienced UBT that ranged from 30 minutes to 120 minutes. The spread of UBT indicates that the upper 50 per cent of this cohort of teachers experienced at least 105 minutes of UBT a week, to a top of 255 minutes a week. These descriptive results indicate, therefore, that the daily distribution of UBT is skewed, and could be as low as 6 minutes a day to a high of 55 minutes per day.

Table 2. Distribution of Teachers' Unencumbered Break Time (UBT)

<i>Time (hours)</i>	<i>Time (mins)</i>	<i>Frequency</i>	<i>proportion</i>	<i>cumulative</i>
0.5	30	1	1.72	1.72
0.75	45	4	6.90	8.62
1.00	60	8	13.79	22.41
1.25	75	7	12.07	34.48
1.50	90	9	15.52	50.00
1.75	105	4	6.90	56.90
2.00	120	8	13.79	70.69
2.25	135	2	3.45	74.14
2.50	150	4	6.90	81.03
2.75	165	3	5.17	86.21
3.00	180	1	1.72	87.93
3.25	195	2	3.45	91.38
3.50	210	1	1.72	93.10
3.75	225	3	5.17	98.28
4.25	255	1	1.72	100.00

Effect of UBT on Sunday Time Allocation

Data provided in [Table 2](#) highlight the importance of understanding the extent to which the distribution of UBT affects time allocation by teachers. Accordingly,

Table 3 shows results of two OLS models: one linear and the other non-linear. The linear OLS model and non-linear (double logarithmic) OLS models are estimated, respectively,

$$Y = \alpha + \beta X + \varepsilon \quad (1)$$

$$\ln(Y) = \ln(\alpha) + \beta \ln(X) + \ln(e^u) \quad (2)$$

In these two models, Y is Sunday time-use of teachers, and X is the UBT variable. The results of ANOVA suggest a significant impact of UBT on linear and non-linear Sunday time expenditure. The OLS results show that the R^2 value of the non-linear model is higher than the R^2 value of the linear model. This value of the coefficient of determination ($R^2 = 0.1733$) suggests that the UBT factor contributes up to 17 per cent of the variation observed in Sunday time-use. The low Root Mean Square Error (RMSE) of 0.4348 of the non-linear model, relative to the RMSE of 1.51 of the linear model, points to the likelihood of the nonlinear model being a better fit to the data than the linear model.

As expected from a single factor model of the type shown in **Table 3**, the intercepts are positive and statistically significantly different from zero. This statistical significance points to a host of crucial factors that have been excluded from the model. It is worth recalling that the key parameter targeted is the coefficient of UBT. The coefficient of UBT (β) is negative in both the linear and non-linear models. This consistent negative signs is also evident in the 95 per cent confidence interval estimate for the slope coefficients of the linear and non-linear models. From this negative slope ($\beta < 0$), one can infer, at the five per cent level of significance, that an increase in UBT will lower the amount of time teachers spend on Sunday school work. The next step was to examine and interpret the magnitude of the effect of UBT.

In the case of the linear model ($\beta = -0.55$, $p = 0.004$), the outcome suggested that a unit increase in UBT will lead to 0.55 unit decrease in Sunday time-use. Since the units of measurement of UBT and Sunday time use are the same (all hours), then it follows that an increase in weekly UBT by one hour (60 minutes) will lead to a reduction in Sunday times of 0.55 hours (that is, 33 minutes). Whilst a time gain of 33 minutes on Sunday certainly looks like a small figure, its interpretation needs to be viewed from the perspective of how much school work one would consider *should be done* on weekends, and how much school work *is actually done*. Revisiting the data in **Table 2**, it can be seen that firstly, some teachers do not enjoy even 33 minutes UBT per week at school, and UBT is only expendable during the week. Secondly, as teachers' Sunday time expenditures are typically in the magnitude of 2 to 4 hours, a 33 minute saving on Sunday times is, therefore, a large proportion of Sunday time. In some individual cases, by increasing weekly UBT, the savings in teachers' Sunday times may well result in their doing enough work during the normal week that there would be little need to work on school work during the weekend.

In general, the results reported in Table 3 suggest that: (i) UBT lowers Sunday time allocation of teachers, and (ii) the non-linear model is superior to the linear model, especially for a single factor model.

Table 3. Regressions of Sunday Times on Unencumbered Break Time (UBT)

	(linear)	(nonlinear)
Number of observations	58	46
ANOVA (MSS (model), $df_1=1$)	13.796	1.743
ANOVA (MSE(residual), $df_2=56$)	2.29	0.189
F-value	6.03 ^(a)	9.22 ^(b)
Prob > F	0.017	0.004
R-squared	0.10	0.1733
Adjusted R-squared	0.80	0.1545
Root Mean Square Error (RMSE)	1.51	0.4348
Intercept (α)	2.998	1.67
SE(α)	0.09	0.46
t-ratio	18.03	6.47
p-value	0.000	0.0001
(α) Lower 95% CI	1.49	2.07
(α) Upper 95% CI	1.86	3.93
UBT slope (β)	-0.55	-0.41
SE(β)	0.134	0.22
t-ratio	-3.04	-2.45
p-value	0.004	0.017
(β) Lower 95% CI	-0.68	-1.003
(β) Upper 95% CI	-0.14	-0.102

Notes: (a) degrees of freedom for the linear model are ($df_1 = 1$, $df_2 = 56$), and the degrees of freedom for the non-linear model are ($df_1 = 1$, $df_2 = 45$).

Effect of UBT on Weekly Time Allocation

Table 4 provides SUR analysis relating to the effect of the UBT variable on all days of the week, in models that are: (i) inclusive of other variables, and (ii) have contemporaneous correlation in SUR embedded in the model. As emphasised, earlier, the rationale for using SUR was rooted in the observation that how a teacher

allocates time in any one given day may govern and may also be governed by time allocation in other days. In other words, what may seem to be an unrelated allocation of time across days may be actually related (Cochrane & Logan, 1975; Greene, 1993). The SUR results reported in Table 4 and Table 5 are based on the linear model; it is important to note that in Table 4 time budgets are the dependent variable whereas in Table 5, time shares are used as the dependent variable. The time budgets are the actual hours expended on each day, whereas the time shares are the

Table 4. Determinants of Teachers' Time Budgets using Seemingly Unrelated Regressions

	MON	TUE	WED	THUR	FRI	SUN
Constant	-4.85*	8.61*	3.03	-3.79	6.61*	11.10*
Dmo		0.63*	0.40*	-0.22	-0.47*	0.29*
Dtu	0.71*		-0.13	0.27†	-0.2	0.08
Dwe	0.44*	-0.13		0.59*	0.03	0.05
Dth	-0.17	0.17†	0.39*		0.59*	0.17*
Dfr	-0.26*	-0.1	0.03	0.49*		
Dsu	0.49*	-0.11	0.27†	0.32	0.21	0.01
Fulltime	2.75*	-0.19	-1.01	0.14	4.25*	-0.82*
age3	0.72	-1.38*	-0.14	0.83	-0.95	
Noschs	0.46	-0.45	0.09	-0.48	0.31	0.15
Exastr	-0.05	0.27	-0.27	0.22	0.21	-0.06
Stscl	0.31	-0.56*	0.00	0.60*	-0.58*	-0.18
locatn1	-0.02	0.35	0.52	0.54	-0.42	-0.80*
tt9	-0.15	0.09	-0.03	-0.2	0.11	0.17*
tt11	0.00	-0.07	0.03	0.18	-0.12	-0.19*
tot_af	-0.1	0.12	0.04	-0.14	-0.03	0.00
tot_hf	0.00	-0.03	-0.24	0.2	0.06	0.22*
UBT	0.52†	-0.44†	0.12	0.34	-0.26	-0.55*
n_active	0.01	-0.09	0.17	-0.06	-0.2	0.01
dmf_s						-0.13*
RMSE	1.57	1.43	1.44	1.81	1.97	0.83
R-squared	0.65	0.52	0.43	0.56	0.64	0.73
Chi-squared	203.7	106.8*	79.1*	134.3*	149.5*	186.8
p-value	0.001	0.001	0.001	0.001	0.001	0.001

Notes: (*) significant at the 5 percent level, that is $p < 0.05$;

(†) significant at the 10 percent level, that is $p < 0.10$.

proportion of weekly time that is allocated to any particular day of the week. The significance of discriminating budgets from shares has a considerable bearing on the interpretation of the results. In the case of time budgets (Table 4), the coefficients (β values) represent the changes in time allocation that results from a unit change in UBT. In the case of time shares (Table 5), a unit change in UBT leads to β value percentage change in time allocation.

The results reported in Table 4 and Table 5 show the following: The SUR determinants of daily time budgets suggest that increasing break time reduces

Table 5. Determinants of Teachers' Time Shares using Seemingly Unrelated Regressions

	MON	TUE	WED	THUR	FRI	SUN
Constant	50.97*	86.86*	63.81*	92.47*	78.03*	53.23*
dmo_s		-0.25†	-0.35*	-0.91*	-0.81*	0.28*
dtu_s	-0.18†		-0.62*	-0.75*	-0.60*	0.10
dwe_s	-0.51*	-1.27*		-1.13*	-1.02*	-0.09
dth_s	-0.64*	-0.75*	-0.54*		-0.79*	0.11†
dfr_s	-0.83*	-0.86*	-0.71*	-1.16*		
dsu_s	-0.65*	-1.42*	-0.95*	-1.39*	-1.18*	
Fulltime	4.83*	-1.01	0.14	3.26*	2.76	0.66
age3	0.76	-0.84	-0.25	0.14	0.25†	-0.06
Noschs	1.19†	0.49	0.68	1.06	1.10	0.41
Exastr	-0.38	-0.31	-0.38	-0.40	-0.46	-0.17
Stscl	0.19	-0.63	-0.27	-0.19	-0.13	-0.30
locatn1	-0.27	-0.81	-0.39	-0.77	-0.69	-1.12
tt9	-0.06	0.39†	0.20	0.20	0.15*	0.25†
tt11	-0.67*	-0.90*	-0.67*	-1.04*	-0.91	-0.61*
tot_af	-0.31	-0.29	-0.26	-0.45	-0.37*	-0.24
tot_hf	0.53	0.85*	0.58*	1.02*	0.80†	0.69*
UBT	-0.08	-1.45	-0.83*	-1.00†	-0.80	-0.99*
n_active	0.36	0.26	0.28	0.38	0.40	0.17
dmf_s						-0.60*
RMSE	2.63	3.32	2.34	3.44	2.93	2.00
R ²	0.81	0.68	0.70	0.61	0.87	0.57
χ^2	378.8*	304.5*	332.9*	300.8	949.4	225.5*
p-value	0.001	0.001	0.001	0.001	0.001	0.001

Notes: (*) significant at the 5 percent level, that is $p < 0.05$;
 (†) significant at the 10 percent level, that is $p < 0.10$.

teachers' Sunday time allocation (UBT: $\beta=-0.55$, $p<0.05$), and marginally affects Monday (UBT: $\beta=0.52$, $p<0.10$), and Tuesday (UBT: $\beta=-0.44$, $p<0.10$) time budget allocations. That is, a minute increase in teachers' UBT is likely to lead to a 0.55 minute decrease in Sunday and Tuesday work times, whilst marginally increasing Monday work times. Increasing UBT decreases Wednesday (UBT: $\beta=-0.83$, $p<0.05$), Thursday (UBT: $\beta=-1.00$, $p<0.05$), and Sunday (UBT: $\beta=-0.99$, $p<0.05$) time shares. The results obtained from SUR suggest that teachers who enjoy significant UBT are less likely to allocate a significant amount of their work time to work on Sundays.

In SUR, break time (UBT) is included as a variable explaining teacher time-use. The SUR determinants of daily time budgets suggest that increasing break time reduces teachers' Sunday time allocation (UBT: $\beta=-0.55$, $p<0.05$), and marginally affects Monday (UBT: $\beta=0.52$, $p<0.10$), and Tuesday (UBT: $\beta=-0.44$, $p<0.10$) time budget allocations. That is, a minute increase in teachers' UBT is likely to lead to a 0.55 minute decrease in Sunday and Tuesday work times, and marginally increases Monday work times. Increasing UBT decreases Wednesday time shares (UBT: $\beta=-0.83$, $p<0.05$), Thursday (UBT: $\beta=-1.00$, $p<0.05$), and Sunday (UBT: $\beta=-0.99$, $p<0.05$), time shares. The results obtained from SUR suggest that teachers who enjoy significant UBT are less likely to allocate a significant amount of their work time to work on Sundays.

The results from [Table 4](#) support the results displayed in [Table 3](#). For example, the effects of UBT on Sunday times is shown as (UBT: $\beta=-0.55$, $SE(\beta)=0.134$, $p<0.05$) in [Table 4](#), and the effect of UBT in a SUR model that incorporates a host of other variables yields the following slope coefficient for UBT: (UBT: $\beta=-0.55$, $p<0.05$). This is a significant result because UBT has maintained its sign, magnitude and direction; and, UBT does not affect any other time allocation significantly or to the same magnitude.

DISCUSSION

Break time appears to be productive as argued in Carlin (1997) and Dababneh et al. (2001). Unlike other studies that look at break time and wage differentials, the results reported in this paper have focussed on the impact of break time on time allocation over the days of the working week as well as weekend time allocation for full time teaching staff. The effect of break time on paid work (normal working week work) was investigated through the impact of break time on unpaid (weekend) work. This approach is novel in that it shows clearly the impact of break time, and highlights that such an impact would be latent (hidden) if the research focus is directed mainly on the normal working week. The analysis of the categories of break time, and the frequency of scheduling of rest breaks have also been found to be important in job design studies (Dababneh et al., 2001), improving comfort at work and enhancing productivity (Carlin, 1997; Dababneh et al., 2001). It has been argued that the careful selection of "optimal rest break scheduling" (Dababneh et al., 2001, p. 165) is paramount.

The results reported in this analysis indicate that in the context of teachers' work, providing teachers with a short break has implied productivity gains. A policy shift should focus, therefore, on giving teachers unencumbered break time although allocating break time during work time has been identified previously as problematic. For example, Dababneh et al. (2001), warn that

Often management is concerned that rest breaks will reduce production. Others may be willing to invest in giving more break-time to workers but are uncertain how to divide the break time over the work day. (p. 165)

In the context of this study, evidence regarding how break time of full time teachers affects Sunday work time is used to propose the quantum of UBT that teachers may require. This study falls short, however, in that it does not identify where that allocation of time should be made. Such an exact prescription and placement of break time requires a qualitative approach to teacher time allocation behaviour – particularly how teachers experience time breaks. This direction of research is outside the scope of this paper; what is very clear, though, is that the notional unencumbered break time required is on average 12 to 15 minutes a day (for each working day of the week). Such a small extent in UBT will reduce Sunday work times, considerably – and may in some instances eliminate non-voluntary Sunday work times. The allocation of 12 to 15 minutes a day can be done in segments or as a bulk amount of total time allocated to teachers. The choice of the method of allocating unencumbered time should take into account teacher, class, school, and community requirements.

CONCLUSION

The results of the likely impact of UBT on teachers' time allocation behaviour suggests that a moderate increase in UBT will lead to decreases in weekend time expenditures, and marginally change the allocation of time during the teaching week. Reducing Sunday work times of teachers has considerable welfare gain for teachers. Therefore, consistent with Bechtold, Janaro and Summers (1984), Romer (1987), Carlin (1997), and Dababneh et al. (2001) 'sufficient' break time has a positive effect on worker productivity and worker well-being, and "taking time off for short breaks will not necessarily cause production to drop" (Dababneh et al., 2001, p. 173). The results obtained from SUR suggest that teachers who enjoy significant UBT are less likely to allocate a significant amount of their work time to work on Sundays. The quantitative results support the qualitative sentiments that point to the fact that teachers are generally robbed on 'unencumbered time'. The statement: "Give me a break, will you?" complements, therefore, the general view of teachers being overburdened by endless reforms as well as reinforcing the notion that meaningful break-time in workplaces enhances productivity. The results reported here have significant education policy implications and can contribute to collective bargaining as part of enhanced teacher work conditions. This research study also has implications

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for teachers' well-being as they commit their emotional labour to meet the ever-changing demands of the education process. Any amount of break time given to Tasmania teachers would certainly be received with the traditional Australian cheer, "You Beauty!", because indeed uninterrupted break time (UBT) is the "you beauty" in teaching.

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JUST GIVE ME A BREAK, WILL YOU? EFFECTS OF UNINTERRUPTED BREAK TIME

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SECTION 3

RESEARCHING EDUCATIONAL TECHNOLOGIES

NOLEINE FITZALLEN & JILLIAN DOWNING

ENGAGEMENT AND EDUCATIONAL TECHNOLOGIES

Engagement in the educational context is a fundamental principle that underpins the relationships and interactions among teachers, students, and resources. This simplistic stance belies the complexities of those relationships and the individual components. Each of the components has multiple characteristics and dimensions that add to the complex nature of learning and teaching, which may vary for different levels of schooling. With the advent of the digital age, the relationships between students and the teachers are often mediated through the use of educational technologies, which include software applications, learning management systems, web-based resources, and technological devices such as interactive white boards. In order to be able to contribute to fostering and building upon any of those relationships within the educational technology context it is worthwhile developing an understanding of the nature of the connections among teachers, students, and resources, in terms of engagement.

Educational technologies are often praised for fostering student engagement (Dashper, 2005; Kean, Embi, & Yunus, 2012) but as Hikmet, Taylor, and Davis (2008) and Neal (2006) warn, increased engagement does not always result in the realisation of improvements in intended learning outcomes. There are, however, benefits other than just academic achievement to consider, such as development of self-awareness and self-monitoring skills (Neal, 2006). Some research has explored the way in which particular software packages influence student thinking and reasoning (e.g., Fitzallen, 2012), how learning management systems support learning online (e.g., Bolliger & Wasilik, 2009), the ways in which classroom practices are transforming learning (e.g., Watson, 2007), and the way in which increased connectivity has the potential to foster cultural change in teaching and learning (e.g., Stack, Watson, & Abbot-Chapman, 2011). Studies such as these tend to take an instrumental perspective because they focus on issues associated with how technologies are accessed. Often, they do not acknowledge the other influences afforded by educational technologies, such as metacognitive development, experiential learning, and interpersonal learning facilitated by those technologies (Phelps, Graham, & Thornton, 2006). A broader perspective within which evaluation of specific applications and resources are situated, would provide a more holistic view of the aspects of using educational technologies that foster improved learning outcomes and student engagement more broadly.

DEFINING ENGAGEMENT

Recent years have seen growing interest in the concept of engagement, but perhaps most particularly in the university context (Krause, 2005). This may be due to increased competition for students (Shattock, 2010), or the desire for improved retention rates (Braxton, Hirschy, & McClendon, 2011) or deserved interest in researching the effect of a rapidly changing environment for students (Rovai & Downey, 2010). For the purposes of this chapter, we will adopt the definition provided by the Australian Council for Educational Research (ACER). ACER is an organisation whose mission is to create and promote research-based knowledge, products and services that can be used to improve learning across the life span. One of ACER's responsibilities is the administration of the Australasian Survey of Student Engagement (AUSSE), in which many universities in Australia and New Zealand participate. While earlier definitions of 'engagement' focussed on time-on-task, this has broadened in recent years to acknowledge the opportunities and constraints for students in educational settings. ACER (2011) define 'engagement' as "students' involvement with activities and conditions that are likely to generate high-quality learning" (p. vi). This definition allows for the concept of engagement to become a practical lens to examine and assess student activity and thus, opportunities for institutions to enhance the students' experience. Importantly, while the survey administered by ACER is focussed on student engagement, the role staff play in fostering that engagement is acknowledged: "while students are seen to be responsible for constructing their knowledge, learning is also seen to depend on institutions and staff generating conditions that stimulate and encourage involvement" (Richardson, 2011, p. 17). For this to occur, staff too must feel engaged, and be dedicating time and effort to educationally purposeful activities.

The literature on measuring engagement in educational technology environments is limited (Reading, 2008). There are, however, two studies that are particularly note-worthy. The first, conducted by Zhao and Kuh (2004) explored the relationship between online learning communities and student engagement in the university context. Their study used 26 indicators of engagement that were arranged in six main categories:

1. Academic effort;
2. Higher order thinking skills required in the courses;
3. Academic integration;
4. Active and collaborative learning;
5. Interaction with faculty members;
6. Diversity related experiences. (p. 123)

The results from the Zhao and Kuh study showed that there were value-added effects of participating in the online learning communities for most of the categories. In the second study, Reading (2008) developed engagement indicators in conjunction with classroom teachers. The indicators included increased interaction between students,

initiated work without teacher direction, learning because they wanted things to happen, and wanting to learn new skills. The indicators were sorted by the teachers into three overarching groups, *Behavioural*, *Emotional*, and *Cognitive*. Reading's three groups of indicators provide a simpler way to describe student engagement than expressed by Zhao and Kuh. It encompasses most of their categories but is deficient in that it does not explicitly address the connections to academic achievement.

A more recently developed engagement framework by Pittaway (2012) subsumes both Reading's (2008) and Zhao and Kuh's (2004) notions of engagement. It aligns with the definition of engagement used in this chapter. The purpose of Pittaway's framework was to support a range of initiatives to enhance both staff and student engagement in a Faculty of Education in a mid-sized university in Australia. Pittaway's engagement framework provides a useful set of five elements (Figure 1), or lenses, through which to examine the engagement of both students and staff. Her framework rests on four principles:

- To engage students, staff must also be engaged;
- The development of respectful and supportive relationships is paramount for learning and teaching;
- Students are given – and take – responsibility for their learning; and
- Students develop knowledge, understandings, skills and capacities when their learning is scaffolded, high standards are set, and expectations clearly communicated (Pittaway, 2012, p. 40).

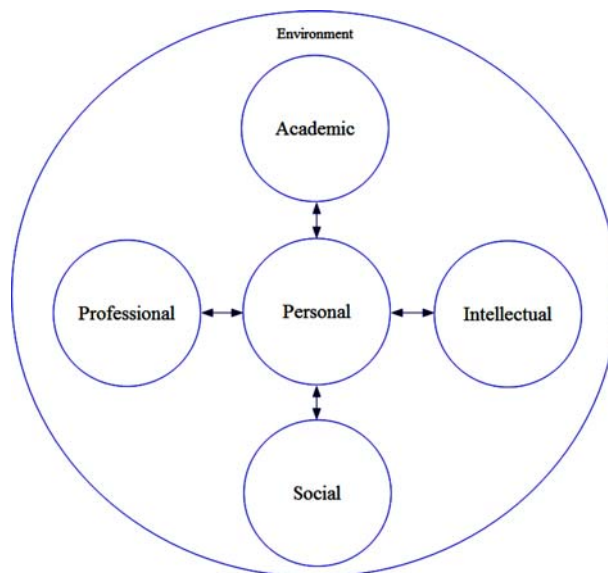


Figure 1. Pittaway's (2012) Framework of Engagement – Elements of Engagement.

The central element of personal engagement refers to what the individual brings to the environment; their expectations, attitudes, motivation and abilities. Academic engagement refers to the actual skills and attitudes required in a university, such as listening, problem solving, researching, and evaluating. Intellectual engagement is related to academic engagement, but encompasses the critical consideration of the concepts and ideas within the chosen discipline, often identified through ethical dilemmas and societal debates. Social engagement involves the interaction between students and their peers, their teachers, and the broader university community. It recognises the socio-constructivist perspective on learning, and the potential of communities of practice in the university environment. And lastly, professional engagement is concerned with connections with the networks and organisations that are associated with the chosen discipline. It is about building relationships, partnerships, and shared experiences with the people and associations; to become an active, valued part of the chosen profession.

Although developed with pre-service teachers and university lecturers in mind, Pittaway's (2012) engagement framework can be applied to other contexts and purposes and is applicable across all levels of schooling. For this chapter, it provides a common stand from which to unpack engagement in educational contexts that utilise educational technologies in a variety of ways.

THE CHAPTERS

The elements of engagement exemplified in Pittaway's (2012) framework are used to examine the chapters in this section. In particular, we identify the affordances of educational technologies explored in the research projects, with a particular focus on implications for staff and their professional development in educational settings.

Personal Engagement

Beginning with the central element of personal engagement, the research reported in Fan and Le identify the importance of staff committing personally to the potential of web-based technology, and in particular, its role in the implementation of new modes of study offered to students. The adoption of online teaching and learning in the higher education sector has been wide spread and is now found across a wide range of disciplines (e.g., business, education, health, psychology, accounting, information technology) and program levels (e.g., from associate diplomas to doctorate degrees). For academics comfortable with teaching face to face on campus, the shift towards online teaching can be daunting at best, or terrifying at worst. Academics are well aware of the high expectations of today's students, who seek an authentic, stimulating and rewarding environment (Herrington, Reeves, & Oliver, 2010).

Despite a plethora of research into the design and facilitation of online environments in universities and an abundance of comparative studies between different modes of learning delivery, there is only a modest body of research reporting on academics'

personal perceptions of their own preparedness to teach online and their beliefs in the effectiveness of the online learning environment. McQuiggan's (2007) comprehensive review of the literature examining faculty development concluded that "there is little reporting of reflective thought, questioning of prior beliefs and assumptions... or rethinking their teaching philosophy" (p. 1). Fan and Le's conclusions reiterate the need for supportive strategies to facilitate staff development, recognising the personal commitment that is required in a rapidly changing university environment. Similarly, but in a different context, Saville, Beswick and Callingham identify personal attributes such as high levels of motivation, confidence, and self-efficacy as key characteristics of the teachers who will be successful in implementing new technologies such as interactive whiteboards. In their discussion on the role of information literacy, Patterson and Muir remind us that access alone does not equate to a more knowledgeable society. The key to unlocking the potential largely lies with the teachers in schools, who must recognise the power of information literacy and facilitate effective use of the vast store of resources available on the Web. This is particularly relevant today with the implementation of the National Broadband Network and the potential it offers for cultural change in learning and teaching (Stack et al., 2011).

Academic Engagement

For staff to engage academically with the online learning and teaching environment there needs to be a strong support system to facilitate that engagement. As discussed by Patterson and Muir when they cite Marcoux "...mere access to information does not ensure knowledge. Knowledge grows through acquiring information, evaluating and using information effectively" (1999, p. 13). This requires commitment of all stakeholders. For academic staff, there are significant concerns about increased workload due to the additional time required to master the technology, create course materials, and facilitate student interactions using the available educational technology (Bolliger & Wasilik, 2009; McQuiggan, 2007; Paulus, Myers, Mixer, Wyatt, Lee, & Lee, 2010). The resulting pressure can undermine teachers' academic engagement, and potentially lead to self-doubt in their ability to perform adequately. In a study of the perceptions of academics teaching within a fully online teacher education course, Downing and Dyment (2013) found a strong correlation between the academic engagement of teachers (through experience or professional development activities), and their belief that the online environment could be an effective method for preparing pre-service teachers. This is consistent with other studies that support the notion that academic engagement will lead to increased confidence and competence in working with educational technology (Fish & Gill, 2009; Robina & Anderson, 2010; Ward Ulmer, Watson, & Derby, 2007). This is particularly relevant when considering innovative teaching strategies such as the video-based intervention described by Rayner. With such exciting potential for improving educational outcomes for children with autism, Rayner's research

highlights the need for continued studies in the possibilities offered by today's technologies. Contrasting this are the findings of Patterson and Muir, as they note the limited engagement and discourse in relation to the teaching and learning of information literacy skills within the primary and secondary sectors. Clearly there lies greater scope for academic engagement in this particular area.

Intellectual Engagement

Without doubt, the educational technologies available today can offer an opportunity for staff to take a fresh look at pedagogical approaches in education, and as suggested by McQuiggan (2007) "in rethinking their familiar ways of teaching... shift from a teacher-centred instruction to student-centred instruction" (p. 5). As an example, in 2013 the University of Tasmania is implementing a new learning management system, which is referred to as MyLO, but is underpinned by the Desire2Learn software platform (www.desire2learn.com.au). One of the three associated goals with this implementation is the development of a renewed curriculum that reflects the affordances of this new technology (University of Tasmania, 2013). Similar opportunities are highlighted in the research findings of Saville et al. who identify the potential for Interactive Whiteboards (IWBs) to transform the ways teachers teach. The opportunities are tempered, however, by the challenges noted by Betcher and Lee (2009, p. 1-2), for teachers to "master the tools and the mindset to begin claiming that potential," and the related findings of Saville et al. that many IWBs are not presently used to anywhere near their full potential. Clearly, intellectual engagement is lacking, or being inhibited, by barriers such as time or limited resources. It reinforces the findings of Fan and Le for an organisational commitment to support the efforts of staff to examine, evaluate and implement new strategies and pedagogies that are possible in today's classroom.

Social Engagement

Perhaps more than any other element, today's educational technologies can foster the social engagement of both staff and students. Web 2.0 tools, such as Wikis, Blogs, ePortfolios and other applications allow users to interact easily and quickly. Within learning management systems, such as MyLO, online discussion boards offer effective asynchronous discussions that can encourage higher order thinking, such as critiquing, evaluating and synthesising (Salmon, 2003). Once teaching staff are comfortable using the technology themselves, they are able to create learning environments that have the potential to foster increased social engagement. The literature clearly suggests that increased social engagement leads to better retention and academic results (see, for example, Bryson & Hand, 2007; Gibbs & Poskitt, 2010; Kahu, 2011; Masters & Donnison, 2010). For staff undertaking the challenge of mastering new technologies, the need for social engagement with peers is equally

important. Interaction with other staff members travelling the same journey allows them to consider other perspectives and views, and recognise that others may feel equally challenged by the learning curve facing them. Similarly, research by Downing and Dyment (2013) identified the critical need for ‘at-elbow’ support for teaching staff, in preference to (but not eliminating the need for) published manuals, online tutorials and central workshops. The difference is clearly associated with the social engagement that ‘at-elbow’ support provides – a feeling that a positive relationship is developing between teacher and support services, and the consequential building of levels of self-efficacy.

Saville et al. identify the potential for IWBs to stimulate both the quantity and quality of dialogue between students and teachers. Indeed, the authors emphasise the importance of maximising the capacity of the technology to encourage interaction in the classroom, in order to move away from a more didactic teaching style. Such social engagement enhances the students’ capacity to become more involved in their learning, and increasingly take responsibility for what and how they learn. One team of prominent researchers of the affordances and potential limitations of online learning argues that “social presence is a mediating variable between teaching presence and cognitive presence” (Garrison, Cleveland-Innes, & Fung, 2010, p. 31). In other words (and applicable to other environments where technology is a medium of teaching), social engagement can make the bridge between the teacher’s presence and the intellectual engagement of students. This reinforces the call from Fan and Le and also Patterson and Muir for regular professional development opportunities for staff to master the technology that is available to teachers today.

Professional Engagement

For staff to feel engaged professionally, the pre-requisite step is to accept advantages offered by the educational technology that surrounds them. This is not something that can be assumed; an examination of the literature on eLearning reflects a painfully slow acceptance of the worthiness of this form of learning. Even today, there remains scepticism among academic staff in relation to the efficacy and appropriateness of this form of learning (Faulk, 2010; Mills, Yane, & Casebeer, 2009; McQuiggan, 2007). Yet the sustained growth of the online offerings points to an accepting market, both in the eyes of students, educational providers, and the workplace that will employ graduates. A comparison between 2009 and 2010 commencing student enrolments in universities in Australia reflect a 5.4% increase for on-campus study and 25.7% increase for external or multi-mode study (Australian Bureau of Statistics, 2011). Between 2005 and 2011 the online education industry in Australia has experienced an annual growth of 22.4%, with estimated revenue of over \$4 billion dollars (IBSWorld, 2011). Globally, the statistics reflect a similar scenario with approximately 33% of all higher education students in the USA in 2007 enrolled in at least one online course (Allen & Seaman,

2008). In the United Kingdom, a recent review of the current provision of online education providers reveals that 77% of universities are strategically planning for their online education offerings with 87% of those universities planning to increase their online offerings in the next five years (Higher Education Funding Council for England, 2011).

In classrooms the adoption of educational technologies as learning tools is also out of step with the availability of digital media tools and innovative software applications. In many cases, teachers are neither confident nor comfortable with adopting new technologies. Teachers feel they have an obligation to include it in their learning programs for students but lack the expertise to do so effectively. This is the case for teachers in both tertiary and compulsory years of schooling contexts (Fitzallen, 2005; Fitzallen & Brown, 2006; Fitzallen, Brown, Booth, & Howells, 2008). To utilise a new technology well, it is necessary for teachers to have a good understanding of what the technology brings to learning experiences and combine it with an understanding of the pedagogies that enhance and support student learning (Littlejohn, Margaryan, & Vojt, 2009). This can be achieved by teachers engaging in research literature and having a conversation about professional activities such as the scholarship of learning and teaching. Patterson and Muir begin the conversation with vital background knowledge about information literacy and the way in which students may engage with and interpret digital resources. Rayner continues the conversation by suggesting that teachers need to choose the most appropriate teaching and learning strategies to optimise student learning. Saville et al. bring into the conversation the need for teachers to fully understand and utilise educational technologies to their full potential. And finally, Fan and Le emphasise the importance of understanding students' and teachers' perceptions and attitudes towards the use of educational technologies.

In addition, in order for teachers to engage professionally, there needs to be appropriate opportunities for them to remain (or become) involved with relevant external associations, conferences, registration bodies, and other professional organisations related to their discipline, and the teaching of that discipline. The uneven implementation of technology-enhanced learning across (and sometimes within) institutions points to variable levels of professional engagement from staff (Andrews & Steel, 2011). Perhaps this is hardly surprising though, given the increasing pressure on academics in higher education to publish (or perish), compete for funds, and cope with increasing student-to-teacher ratios (Gannon Cook, Ley, Crawford, & Warner, 2009). Doherty, Steel, and Parish (2012), in their analysis of the challenges and opportunities for professional societies in higher education, conclude that vigilance of trends and factors, and identification of members' needs and wants are critical to ensuring the continued existence of such organisations. They note the need for educators to embrace new and emerging technologies and the "strong and continued need for a role for professional societies... in supporting staff with their professional development needs" (p. 106).

CONCLUSION

The potential for educational technologies to inform, enhance or revolutionise the learning and teaching environment is unquestioned. In stark contrast to the traditional world of higher education, the new environment is open, transparent, and accessible to more people than ever before. Institutions are responding to the new market enthusiastically. One leading example is edX, a not-for-profit organisation founded by Harvard University and the Massachusetts Institute of Technology. All edX courses are free, including the lectures, learning materials, assessment and certification. One of their most popular courses, *Introduction to Computer Science*, had over 53,000 enrolments from around the world one month before commencement on October 15, 2012 (Harvard Magazine, 2013). The mission of edX moves beyond attracting record student enrolments; however, to a desire to “research how students learn and how technology can transform learning – both on-campus and worldwide” (edX, 2013). Such research is likely to consider the ways in which staff and students are engaging in the learning environment. Interest in the concept of engagement has certainly grown in recent years, perhaps because of the criticality of understanding just how new technologies can enhance the potential for learning. Students, staff, and institutions may engage in different ways and to varying degrees, and frameworks such as Pittaway’s (2012) may offer an effective way to consider engagement with educational technologies through various lenses such as personal, academic, intellectual, social, and professional.

The following chapters in this section present a small slice of what is possible in the digital age yet illustrate the breadth and diversity of educational technologies available and the issues and challenges faced by both researchers and teachers. They also invite readers to investigate further opportunities to maximise the potential of educational technologies to influence and support student thinking and teacher practice.

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SI FAN & THAO LE

WEB-BASED TECHNOLOGIES: INDISPENSABLE RESOURCES IN AN AUSTRALIAN UNIVERSITY CONTEXT

Ubiquitous computing and access to digital resources are making web-based learning more feasible and acceptable and successful web-based learning endeavours can be seen around the globe, as well as within Australia (Robina & Anderson, 2010). The World Wide Web (Web), as an essential means of support, is contributing to the development of remote teaching and providing a wealth of possibilities in the field of education (Wu & Xie, 2012). Most Australian education institutions have adopted web-based technologies to fully or partially support their staff and students. Instead of teachers/lecturers being the only resource in classrooms, web-based technologies are being adopted to conduct both on-campus and off-campus learning, as well as contribute to the notion of virtual universities (Fan, 2011). Web-based technologies have become indispensable, since they provide users with much easier access to resources, as well as convenient ways to teach and learn (Klassen & Vogel, 2003).

Using the University of Tasmania (UTAS) as an example, the study reported in this chapter provides an examination of how highly developed web-based technologies influence teaching and learning in the Australian higher education context. The study provides insights into the significant influences of the Web in teaching and learning practice, as well as the ways in which it is adopted by university teaching staff and students to facilitate learning. It analyses the different understandings of these two user groups across a number of faculties and makes recommendations that focus on how the Web can be adopted to better suit students' needs. The web-based technology under scrutiny in the study is the learning management system, Blackboard Web CT, referred to within UTAS as *My Learning Online* (MyLO). The potential educational benefits identified, educational usage outlined and recommendations made are transferable to other education institutions that intend to provide future students with supportive, effective and meaningful web-based learning environments.

CONTEXT

Within the Australian university context, there is a shift towards delivering courses using web-based technologies. It is driven by “worldwide competition between education establishments and by a rising number of consumers who demand

an increased amount of flexibility” (Bernardes & O’Donoghue, 2003, p. 21). Predominantly, learning management systems are used to deliver course materials and organise resources and the Web more broadly, is used to access additional resources and provide means of communication. Schools and universities have adopted these technologies to support their students in both traditional coursework as well as online learning. It is, however, not expected that all educational institutions will be successful in making the transition from delivering courses via traditional face-to-face mode to web-based learning (Mellahi & Wilkinson, 2004). Thus, education institutions have an urgent need to understand their students’ views and preferences in order to design and adopt teaching activities and resources that suit the students’ needs. Previous research has highlighted the implementation of web-based applications from an instrumental perspective (e.g., Anastasiades, 2007; Blair, 2007; Klassen & Vogel, 2003). However, little research has examined the views of students and teaching staff towards these tools, or the differences in the views of the two groups. Knowledge of student preferences and expectations could assist education institutions and lecturers in understanding students’ needs, thereby achieving a better learning outcome (Craig, Goold, Coldwell, & Mustard, 2008). Therefore, an investigation into students’ and instructors’ views on web-based technologies has the potential to increase this knowledge so that web-based instruction can be optimised.

As a forerunner amongst Australian universities, UTAS is committed to ongoing continual improvement and strategic planning for web-based learning to “leverage the existing systems, people, intellectual capital and skills” and thereby “to improve the quality of (its) offering to students and to extend the reach of the university” (Fountain, Kregor, & Williams, 2010, p. 1). To facilitate this, UTAS encourages the application of a blended learning style with the incorporation of web-based technologies into teaching and learning to support its students. The learning management system, MyLO, provides that support by delivering learning programs on or off campus via three types of web-based learning environments (UTAS, 2012):

- Web-supported model: MyLO and web-based applications are used to supplement face-to-face or print-based distance education delivery;
- Web-dependent model: MyLO and web-based applications operate as an integral part of the unit program and complements face-to-face or print-based distance delivery; and
- Fully online model: MyLO and web-based applications are used for access to, and interaction with educational content, communications between teaching staff and students, and for aspects of assessment.

METHODOLOGY

To fulfil the research aim, which was to investigate the role of web-based technologies in one particular Australian university context, the study utilised both

quantitative and qualitative methods to gather and analyse data. The main research objectives were:

- To examine the views of students and teaching staff on the significance of web-based technologies in learning and teaching;
- To identify the ways in which web-based technologies are used by students and teaching staff to facilitate learning;
- To compare the views of students and teaching staff on the adoption of web-based technologies in learning and teaching;
- To evaluate the web-based learning environments in different academic areas at UTAS;
- To provide some recommendations for enhancing web-based learning.

Included in the study were the Faculties of Arts, Business, Education, Health Science, Law, as well as the Faculty of Science, Engineering & Technology, and the Australian Maritime College. The study involved the participation of 502 students and 100 academic teaching staff at the University. The data collection was organised into two stages: a quantitative and a qualitative stage. The quantitative stage (phase one) was conducted firstly, by distributing a 43-item questionnaire to the administrative staff who were requested to forward the questionnaire to all the students and staff in their faculty/discipline. The first section of the questionnaire consisted of seven demographic questions, while Questions 8 -15 reported upon in this chapter were 5-point Likert scale questions. The participants could indicate on the scale (from Strongly Agree to Strongly Disagree or from Very Often to Never) their responses for the question. Data gathered from this stage were analysed using SPSS (Statistical Package for the Social Sciences) Version 18.0. The techniques involved the investigation of the median values, as well as analysis of Kruskal-Wallis tests, Mann-Whitney U tests and Spearman's Rank Order Correlation.

Afterwards, in the qualitative research stage (phase two), semi-structured interviews were organised with 17 students and eight teaching staff from different faculties/disciplines. These participants were selected using the stratified sampling approach from those who expressed an interest and contacted the researchers. Their interview responses were analysed using a constructivist grounded theory approach and a three-step coding approach: Open coding, Axil coding and Selective coding (Sarantakos, 2005). The qualitative data analysis was performed using NVivo software, Version 8.

FINDINGS

This research has uncovered five dominant findings which respond directly to the research objectives. These include the significant role of the web-based technologies at the University; the way in which web-based technologies were adopted widely by students and teaching staff within all the seven faculties/disciplines; the differing views and behaviours of the two participant groups; evaluation of the

web-based learning environment and the MyLO system; and the expectations and recommendations made on the future development of web-based education within the University. Overall, the findings were positive but both participant groups were able to identify challenges and difficulties encountered.

Significance of Web-based Technologies

The significant role of the Web was widely recognised by the students and teaching staff at UTAS. A variety of web-based tools were adopted for various academic purposes. These web-based resources made contributions in teaching and learning, especially in collaboration and individualised learning, as well as the development of a learner-centred pedagogy. Web-based technologies had changed students' learning opportunities in terms of the type of learning materials accessed, the delivery of information/instructions, the assessment tasks utilised, the modes of communication, and how time was spent. For instance, one student participant from the Business discipline argued that:

I use Google very often to "Google" information. It is quick and convenient. And I can download many documents as PDF files. There is heaps of information (on the Web), so most of the time I prefer to surf on the Internet instead of going to the library. Books and ideas you get from the library can be old sometimes.

The web-dependent model was the preferred mode among the three web-based learning models at the University: the web-supported (or supplementary) model, the web-dependent (or blended) model and the fully online model. The majority of courses were developed within the web-supported model and the web-dependent model, while only a small number of courses were organised in the fully online model (UTAS, 2012).

There emerged a number of influential factors that affected the accountability and effectiveness of web-based resources. Apart from the usability of the tools, users' intentions, expectations, willingness and ability to manage the tools can also affect students' performance in web-based education and thereby influence the potential learning outcomes. This is shown in one participant's responses to the questionnaire:

It is not MyLO or the Web that limits or enhances the potential for learning. It is the pedagogical soundness of what the unit coordinator creates, and the regular presence of the lecturer/tutor in the online environment.

Instrumentality of Web-based Technologies

The Web was used in a variety of ways to support the teaching and learning practice. The eight dominant purposes highlighted were communication, information retrieval, online tools (e.g., assignment submission tools and calendar tools), supplementary tools (e.g., using emails to make appointments), collaborative learning, assessment,

feedback and entertainment. While the Web was adopted by both students and staff for the first five purposes, only the staff used it for the purposes of assessment and feedback, and only the students used it for entertainment purpose. Although the participants' responses to these Web usages vary among genders, academic faculties/disciplines, lengths of studying/teaching and different levels of information technology (IT) skills, it was a general agreement that the Web and MyLO had become essential tools that enabled teaching activities to be performed. This is evident in [Table 1](#) below, which reports the statistical results of Q8 to Q15 of the questionnaire. These questions were designed specifically to examine the frequencies of web-based technology adoption by the participants.

Table 1. Frequencies and Median values obtained on Q8 to Q15

<i>Question items</i>	<i>N= 598, Missing data=4</i>			
	<i>Median</i>	<i>Mean</i>	<i>95% CI for M</i>	
	<i>(Me)</i>	<i>(M)</i>	<i>Lower</i>	<i>Upper</i>
Q8. How often is the Web used to support students' learning in your course?	2.00	1.85	1.78	1.92
Q9. How often is the Web used as a communication tool in your course?	2.00	2.10	2.02	2.17
Q10. How often is the Web used to find learning materials in your course?	2.00	1.73	1.67	1.80
Q11. How often do you participate in online discussions in your course?	3.00	3.35	3.26	3.44
Q12. How often do you get feedback via the Web in your course?	3.00	3.04	2.95	3.13
Q13. How often do you share learning resources via the Web with other/your students?	3.00	2.81	2.72	2.90
Q14. How often is the Web used as an assessment tool in your course?	3.00	3.03	2.93	3.12
Q15. How often is the Web used as a management tool in your course?	3.00	2.78	2.69	2.87

Descriptive statistics results obtained by participants' responses with respect to Q 8 to Q 15; Median scored on Likert scale: 1=Very Often to 5=Never.

Despite the fact that some faculties/disciplines used the Web and MyLO more effectively and frequently than the others, web-based resources had permeated into the everyday education practice within the whole university context. Communication and information retrieval were emphasised as the dominant purposes of Web adoption at this university as in many other higher education institutions (Mari, Genone, &

Mari, 2008). Web-based technologies were used selectively by the participants for some other academic purposes, such as assessment and collaboration. For instance, the academic areas of Health Sciences, Business, and Law reported a more frequent adoption for these purposes than the other faculties/disciplines ($\chi^2 = 75.214$, $df = 3$, $p\text{-value} = 0.000 < 0.05$).

Different Views and Behaviours of Students and Teaching Staff

A mismatch was uncovered between the views and behaviours of students and teaching staff. While both groups agreed on the significant role of the Web in teaching and learning, there appeared some varied understandings. The lack of communication and inadequate understandings about each other's expectations had, to some extent, caused low student and faculty satisfaction. Some web-based applications and related teaching activities, which were seen as valuable by teaching staff, were not well received by the students. Therefore, these activities did not receive the expected participation and the resources remained unused. This is evident in a student's interview response:

The lecturer of the unit had a sample test ready for us since months ago, but we didn't find out until a couple of weeks before the test.... We should have been told earlier.

Effective communication between students and staff is the key to a more efficient and meaningful web-based learning environment. Communication and interactions are crucial to assure concordant performances of students and teaching staff and to achieve a better understanding of each other's preferences, expectations and reasons of adoption. The results obtained from the questionnaire showed positive correlations between the participants' views and behaviours in web-based learning. For instance, it is revealed in the data that the more positive the respondents view the Web as an opportunity for collaborative learning, the more frequently they would use this tool for this educational purpose (Spearman's Rank Order Correlation test, $r = 0.141$).

Evaluation of Web-based Learning Environment and MyLO

In general, both the overall web-based learning environment and the MyLO system were positively evaluated by the students and staff members. These participants from the seven faculties/disciplines showed various degrees of satisfaction on the web-based learning environment within their own academic areas. High student satisfaction was expressed especially within the faculties/disciplines which have set up strict and detailed guidelines and principles on the support strategies, such as Faculties of Health Science and Business. Students provided evaluations on the web-based activities designed by their lecturers and relevant teaching staff, such as administrators and tutors. While the majority of evaluation appeared to be positive,

there also emerged some limitations and disadvantages in the web-based education of some academic areas. These limitations included the lack of resources, technical issues, differing IT skills, and lack of relevant support or training.

As an essential component of web-based learning, MyLO was evaluated regarding its contents, functionalities, usability, accessibility, suitability for the learning context and learner/user-friendliness. Both positive evaluation and limitations were given by the participants. Suggestions on further improvements were also made. As the learning management system that supports the web-based education for the whole university, MyLO needed to provide its end-users with accurate contents and a structured and convenient way to access these resources. MyLO was highly valued for its contents, functionalities, accessibility and suitability for the learning context. However, some of its functions and interfaces were reported to be inflexible. This low learner/user-friendliness has caused some inconvenience, disappointment and frustration (Le & Le, 2007). Therefore, MyLO should be improved in terms of interfaces and learner/user-friendliness to gain a higher student satisfaction in the future.

Challenges Faced and Recommendations Made by the Participants

Challenges and obstacles in relation to web-based learning were revealed. The advanced web-based technologies have brought some risks and challenges for both educators and students (Wu & Xie, 2012). At UTAS the causes of the problems may be attributed to the imbalance in the adoption of MyLO and other web-based technologies and the lack of support strategies. Inadequate IT skills and low self-confidence can become draw backs in the adoption of web-based resources (Fan, 2011). On one hand, the interview responses revealed that the feeling of isolation and the poor ability in selecting learning resources were influential factors in students' performance. On the other hand, the interview responses revealed the lack of adequate training in some faculties had caused a low self-confidence of students and staff in their own IT skills. Without systematic training, students lack confidence and ability in selecting, accessing, and utilising web-based resources.

Recommendations and suggestions were made by the participants for further improvements of the web-based learning environment and the MyLO system. The recommendations mentioned were effective communication between students and teaching staff and appropriate training sessions. To address the suggestions made it is advisable for educators to know about the students' characteristics, expectations, preferences and desires. Effective communication can help in obtaining this information and allow a more effective learning practice to be achieved. A series of training sessions, however, could be developed with the focus on IT skills, selection of and access to web-based materials and up-dated resources, as well as on-site technical support.

DISCUSSIONS AND RECOMMENDATIONS

Web-based technologies have taken on a significant role at UTAS. Without them, many courses could not take advantage of innovative and creative resources (UTAS, 2012). In particular, those technologies provide flexible information delivery methods and abundant materials, which offer a great deal of conveniences and opportunities for further education (McHaney, 2011). As argued by Matthews,

The ever-accelerating growth in information technology and the proliferation of distance education are exciting developments in higher education that could bring about some of the most profound changes to the ways we teach and learn. They provide extraordinary opportunities to transform the when, where, and how of what we teach. (2003, p. 17)

However, web-based technologies must be adapted to best support the learning activity designed. Students and teaching staff at the university have found the Web-supported and Web-dependent learning modes in which web-based applications operated as the supplementary or an integral part of face-to-face learning delivery to be the most adaptive. This finding is reflected in Jones and Graham's (2010) research, which defines these types of delivery modes as hybrid courses. Within these blended courses, web-based tools were valued to be highly powerful and effective on the basis that adequate face-to-face contacts were also provided. At the moment, face-to-face teaching remains an important teaching delivery mode that is preferred by many of the participants.

Although a high degree of self-motivation and self-direction are required in web-based learning (McLoughlin & Lee, 2010), support strategies need to be provided for both students and teaching staff. These strategies may include training sessions, supportive policies, effective communications between students and staff, and updated web-based resources. Maintaining and developing an effective web-based learning environment requires a great deal of effort from faculties and universities (Jan, Lu, & Chou, 2012; Pagan, 2009). Support systems that are organised with different support sources are necessary in serving students throughout the educational experience (Dhar & Yammiyavar, 2012). Both technological and pedagogical supports are critically important for faculty and student satisfaction, especially within institutions that are rapidly expanding their online course delivery efforts (Lee, Srinivasan, Trail, Lewis, & Lopez, 2011).

Effective communication strategies and understanding of students' expectations must be considered in order to achieve higher student and faculty satisfaction (Shea, Pickett, & Pelz, 2004). It is vital for teaching staff at universities to know about their students' characteristics, expectations, preferences, and desires, in order to foster active student involvement (Svinicki & McKeachie, 2011). Inconsistency and discrepancy in the behaviours and/or views of the two parties may cause under-productivity in learning (Le & Fan, 2010). Efforts are especially needed from educators to understand students' demands, preferences and learning outcomes.

As argued by Shea, Pickett, and Pelz (2004), educators are responsible to identify agreements and disagreement, seek to reach consensus and understanding, as well as to promote positive climates, frequent discussions and regular assessment.

Professional learning opportunities should be in place to inform academic staff about developments, functions and applications of new technologies (Fan, 2011). To complement this, learning activities are required to assist students to establish learning goals and manage their own learning practice (Klassen & Vogel, 2003). Training sessions should provide the opportunity to develop the skills to work within the web-based learning environment. This includes how to utilise learning management system features, selecting and obtaining web-based materials, and using self-assessment tools. In addition, support workshops that help students' to become more self-directed when engaging in web-based learning activities are highly recommended. Assistance should be given in a way that promotes learners' critical thinking skills, autonomous learning and engagement in collaborating with other learners (McLoughlin & Lee, 2010; Quinn, Amer, Lonie, Blackmore, Thompson, & Pettigrove, 2012).

CONCLUSION

The Web, as the most transformative technology in history, is reshaping the teaching and learning process, and transforming the ways in which education is achieved (Weschke, Barclay, & Vandersall, 2011). The last 30 years have seen an incredible growth and development in the web-based education industry. However, these advantages have also come with challenges. The study reported in this chapter has provided insights into the views of students and teaching staff towards web-based technologies and their current adoption. It has highlighted the continual need for the University to provide support strategies that can better assist its staff and students. The recommendations made in this chapter could be used by Australian universities who have a similar web-based learning context to inform policy development and enhance the design of educational activities.

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EMILY PATTERSON & TRACEY MUIR

INFORMATION LITERACY: A RETROSPECTIVE OF THE LITERATURE

This chapter discusses information literacy within an Australian educational context by reviewing significant events, publications, and academic literature. The paper touches on how historical roots have influenced academic discourse on information literacy within the field of education, and subsequently, its prevalence within the current primary and secondary education sectors. Terminology used to describe similar information literacy skills and attributes is summarised, as is a comprehensive definition of the term information literacy. This chapter concludes by advocating for further research on investigating students' information literacy skills and abilities, teachers' content knowledge of information literacy, and the teaching and assessment of information literacy skills, specifically within the primary and secondary education sectors.

SITUATING INFORMATION LITERACY

In the Beginning: Information as a Physical Resource to be Catalogued, Filed, and Managed

The term 'information literacy' was first publicly coined in 1974 by Zurkowski (Cox & Lindsay, 2008) as referring to the storage, access, and location of physical resources within the library. In the context of 1974, this was from the perspective of the librarian managing, organising and storing the information in a physical form. Since the inception of the term 'information literacy' and the rapid evolution of information in digital formats, discussion has been subjugated by the library and information management associations, professional bodies, and academia.

Present day dominance in this area can perhaps be traced back to the origins of the Internet in Australia, which began as a coordinated information provision service under the umbrella of the Australian Vice Chancellors' Committee, who initiated a project titled the Australian Academic and Research Network (AARNet). AARNet established itself as the main Internet Service Provider in Australia (later to be sold to Telstra, under the name BigPond). As such, Internet traffic was predominantly contained within the academic and research sector, via university libraries and institutions with minimal commercial input (AARNet, 2010).

It was around the same time that information literacy first emerged in the Australian landscape with *The Ross Report*, conducted in 1989 by the Australian

National Board of Employment Education and Training (ANBEET), who noted that "...the concept of information literacy does not have a wide currency outside library circles, where it is the subject of considerable literature" (as cited in Bundy, 2004, p. 45). Of interest was the recommendation in the report that information literacy should be occurring within an educational context, stating as a term of reference that higher education libraries should be "... preparing those training in professions in information literacy" (as cited in Bundy, 2004, p. 45).

Concurrently, the American Library Association (ALA) formally identified the term information literacy in 1989 as a skill that requires the ability to "...identify and shape research questions, to access information, evaluate it, and manage it" (Cox & Lindsay, 2008, p. 13). Furthermore, ALA broadened the perspective of information literacy, describing it as a central attribute of lifelong learning "...synonymous with knowing how to learn... [and] a means of personal empowerment" (Bundy 2004, p. 5), effectively shifting the focus of the term from information for the librarian towards information for the user or client.

Shifting Perspectives: Information, Power, and Equality

A second, important shift occurred around the same time in that the ability to source and evaluate information in a new digital environment began to be viewed within equity frameworks as an empowering set of skills contributing to social equality, democracy, lifelong learning and a basic human right. A failure to provide adequate access to the acquisition of information literacy began to be viewed as socially, and personally disempowering (Garner, 2005; Prague Declaration, 2003).

Throughout the 1990s, the library and information management field continued to be preoccupied by information literacy as an essential skill for democratic citizenship, social equitability, and global competitiveness in the new digital environment. Government inquiries and reports, professional bodies and academia were advocating, writing, theorising and discussing information literacy in relation to computing skills and process driven practices in locating, organising and managing the ever increasing quantity of information. These discussions were dominated by the library and information management sector (Cox & Lindsay, 2008); as such the perspectives and emerging standards and frameworks were viewed through the lens of information as an 'object' of great social equality, as opposed to information as a pathway to learning, knowledge and new understandings. That is, until in 1997, when an award winning relational model *The Seven Faces of Information Literacy* was developed by Christine Bruce (as cited in Bundy, 2004).

The 'seven faces' relational model was a global innovation in the way information literacy was perceived and defined beyond process driven behaviours (Bundy, 2004). The model re-conceptualised information literacy as a continuous multilayered experience that is influenced by seven conceptions, loosely focused around the interconnecting relationships between processing skills (computer skills), behaviours and attributes (social and cultural), and knowledge (Cox & Lindsay, 2008). One

outcome from this shift in thinking was a better alignment of information literacy within a broader literacy context that viewed cultural values, social perspectives, and prior experiences as an influential part or ‘face’ of how information literacy is interpreted by an individual, subsequently revolutionising theories of information literacy within Australian academia (Bruce, 2003, 2004).

A second relational model similar but fundamentally different to Bruce’s (1997) model was developed by the Society of College, and National University Libraries (SCONUL) in 1999. *The Seven Pillars of Information Literacy* focused on differentiating computing skills with information seeking behaviours, stating that the driving force behind the model was to ensure that a “...clear distinction is made between information skills and information technology skills” (SCONUL, 1999). As such, the model is strongly embedded in the perspective of information literacy as a set of core process driven skills, essentially disregarding the socio cultural elements highlighted by Bruce (1997).

Information Literacy in the New Millennium: Implications for Learning in the 21st Century

The American Library Association developed the *Information Literacy Competency Standards for Higher Education* in 2000, a significant step for libraries which Cox and Lindsay (2008, p. 17) claim provided a “...coherent framework for librarians and others to discuss a large and often diffuse educational reform agenda that... began to loom much larger than just a ‘library issue’.” The competency standards for higher education reflected a combination of elements contained within SCONUL’s ‘Seven pillars’ model and Bruce’s ‘Seven faces’ model (1997), and is a document that possibly still holds relevance today. By the turn of the century, information literacy had gained global recognition as being not only a lifelong skill, but a skill that was rooted in democratic and free societies (Cox & Lindsay, 2008). In 2003, the US Commission of Library and Information Science sanctioned a National Forum on Information Literacy backed by the United Nations Education and Scientific Cultural Organizations (UNESCO), collectively known as the Prague Declaration (2003), which outlined six principles of information literacy and three urgent policy recommendations. The Prague Declaration represented the first unified international recognition of information literacy as an essential skill for the 21st century learner, and a basic democratic human right. Importantly, it emphasised accessibility and equitability of information literacy in education:

Information Literacy, in conjunction with access to essential information and effective use of information and communication technologies, plays a leading role in reducing the inequities within and among countries and peoples, and in promoting tolerance and mutual understanding through information use in multicultural and multilingual contexts. [Information Literacy]... should be an integral part of Education for All... [and] is a prerequisite for participating

effectively in the Information Society, and is part of the basic human right of lifelong learning. (Prague Declaration, 2003, p. 1)

The *Australian and New Zealand Information Literacy Framework* (ANZIL) (Bundy, 2004), represented a clear shift towards integrating information literacy in all sectors of schooling and across all educational curricula. The ANZIL framework outlines four overarching principles that form the scaffold for six underpinning 'Core Standards' which identify an information literate person. It is implicitly stated that "Information literacy requires sustained development throughout all levels of formal education, primary, secondary, and tertiary" (Bundy, 2004, p. 6). In that document, Bundy (2004) strongly emphasises that information literacy is not to be confined to the tertiary or higher education sectors. Furthermore, the framework clearly articulated that "Achieving information literacy requires an understanding that such development is not extraneous to the curriculum but is woven into its content, structure, and sequence" (Bundy, 2004, p. 6).

The Alexandria High-Level Colloquium on Information Literacy and Life Long Learning (Garner, 2005) was a key marker in firstly affirming information literacy as a global societal and educational issue of significance, announcing it as a "... basic human right in a digital world... [that]... promotes social inclusion of all nations" (p. 3). Secondly, it cemented information literacy and lifelong learning as two inseparable and intrinsically linked concepts, stating that "Information literacy and lifelong learning are of the same essence" (p. 5). It is also of note that the Alexandria High-Level Colloquium on Information Literacy and Life Long Learning contextualized information literacy beyond the traditional library and education landscape by stating that "Information Literacy is more than a library or education issue. It is crucial to issues of economic development, health, citizenship and quality of life" (p. 5).

In 2007, the American Association of School Libraries (AASL) updated the *AASL Learning Standards for the 21st Century* to reflect the new social, political and economic context of digital learning. The document deviated from traditional information literacy terminology, focusing on standards of a learner as opposed to standards of an information literate person. There is also a strong focus on the teaching of ethical behaviours and developing skills in the use and misuse of information in a digital environment, thus clearly acknowledging that information is now predominantly a social experience, which carries a greater social responsibility. This represents a subtle shift from information literacy as a process, that is largely an individual experience, towards information literacy as a complex learning experience in a social and shared environment.

Since the development of the ANZIL framework (Bundy, 2004), the literature indicates that information literacy standards and frameworks in Australia remains embedded within the context of higher education. As such, discussions around frameworks, pedagogies, programs and assessment strategies have revolved around the tertiary education sector. This is despite a consistent voice advocating for

substantial collaborative inclusion across all education sectors which is inclusive of primary and secondary educational contexts (AASL, 2007; Bundy, 2004; November, 2008; Pegrum, 2008). Consequently, the literature on the teaching and learning of skills associated with information literacy such as the authentication, validation, evaluation, and sourcing of digital information in primary and secondary education contexts remains firmly rooted within the library and information management arena.

DEFINING INFORMATION LITERACY

Information Literacy: Developing the Definition in Relation to Learning in Modern Society

Information literacy is universally recognised as a core competency for lifelong learning (Bruce 2003; Bruce & Candy 2000; Bundy, 2004; Education and Manpower Bureau [EMB], 2005; Orr, Appleton & Wallin, 2001; Pegrum, 2008), or a ‘way of learning’ that influences an individual’s ability to continue to learn beyond the traditional confines of formal schooling (AASL, 2007; ALA, 2000; November, 2008). It comprises of a variety of circular interconnecting cognitive skills, personal attributes, and information seeking behaviours that are heavily influenced by sociocultural experiences and expectations (Bruce, 1997, 2003, 2004; Bundy 2004; EMB 2005; Moore, 2006) that effects an individual’s ability to access, locate, interpret, create, manage, evaluate, compare, and authenticate digital information, in a socially ethical manor to generate or gain new knowledge and meaning (AASL, 2007; Bundy, 2004; Marcoux, 1999; Markless & Streatfield, 2007).

The Association for Teacher Librarians of Canada (ATLC, 1997) provides a comprehensive multi-layered definition of information literacy, in that there is a strong emphasis placed on a complex array of interrelated process-driven technological skills and higher order cognitive thinking and uniquely, research strategy skills, stating that an information literate student must “...assess information for quality, authority, accuracy and authenticity” (p. 5). Of specific inclusion is the idea that the individual must:

... recognize the need for information to solve problems and develop ideas; pose important questions... to understand form, format, location and access methods, how information is situated and produced, research processes, and to format and publish in textual and multimedia formats and to adapt to emerging technologies. (p. 5)

More recently in Australia, the Ministerial Council for Education, Early Childhood Development, and Youth Affairs (MCEECDYA) augmented the concept of information literacy to include higher order cognitive thinking skills to appropriately “...interrogate and evaluate information, develop new understandings, and communicate with others in order to effectively participate in society” (2008, p. viii). It is of note that MCEECDYA outlines information literacy as a skill for social

participation, as mirrored in the Alexandria High-Level Colloquium on Information Literacy and Life Long Learning (Garner, 2005), which acknowledged information literacy as an essential skill for equality, social inclusion, empowerment, and global employability. It stated that information literacy has the capability to empower "... people in all walks of life to seek, evaluate, use and create information effectively to achieve their personal, social, occupational and educational goals" (2005, p. 3). Information literacy is therefore widely considered a pivotal human right for a democratic society that promotes equitability, economic stability and personal empowerment (EMB, 2005; Garner, 2005; Prague Declaration, 2003).

Untangling the Terminology: Clarifying Inconsistencies in Language Used

During the course of research, it became apparent that there were considerable disparities between the language used within the two academic fields of library and information science, and education to describe learning and digital technologies. A standard literature search using the University of Tasmania library service search tool Summon™ and the phrase 'information literacy,' returned multiple results predominantly confined to scholarly publications and journals affiliated with library and information sciences. The search results reflected minimal linkages to articles related to education, particularly primary and secondary school education. Results that were related to education were predominantly confined to topics related to the tertiary education sector. A search conducted using truncated terms such as 'digital literac*', 'multiliterac*', 'multimodal literac*', and 'transliterac*' substantially increased the number of education related articles and resources that discussed single elements of information literacy, within primary and secondary schooling. A detailed discussion on digital language inconsistencies is at present, beyond the scope of this chapter. For clarity, a delineation of commonly recurrent terms that emerged during routine searches within these two fields of study is briefly defined.

It appears that the term 'multimodal literacy' is becoming increasingly more common within educational literature. This could, in part be due to the term (multimodal) appearing in the Australian Curriculum Version 3.0 within the content descriptors for the English Learning area (49 occurrences), and within the achievement standards for the Science Learning area (5 occurrences) (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2011a). Walsh (2010) defines multimodal literacy as the "...meaning-making that occurs through the reading, viewing, understanding, responding to and producing and interacting with multimedia and digital texts" (p. 213). References to the management, retrieval, and organisation of digital information is clearly absent in this definition.

The term 'multiliteracies' surfaced in 1996 through the work of a global collective of academics known as The New London Group (Cazden et al., 1996), who published a paper in the Harvard Educational Review titled *A Pedagogy of Multiliteracies: Designing Social Futures*. The paper articulated a theoretical overview of the shift in society away from a reliance on print based text, towards a diversification in the way

literacy was viewed, communicated, and interpreted, and what this shift signified for literacy pedagogy in an educational context. The paper described multiliteracies as an

...approach to literacy pedagogy [that] overcomes the limitations of traditional approaches by emphasising how negotiating the multiple linguistic and cultural differences in our society is central to the pragmatics of the working, civic, and private lives of students. (Cazden et al., 1996, p. 60)

Pegrum (2008) further refined the term multiliteracy as

...individuals who derive and create meaning from multiple forms of digital and print based formats. They easily switch between mediums (videos, still images, audio, print etc.), and quickly access, interpret, share information in a highly mobile, social and educational manner. (p. 61)

Again, whilst the term is similar in meaning to information literacy, the definitions are absent of keywords such as authentication, critiquing and analysing digital or electronic forms of information.

Transliteracy is a relatively new term and one that is becoming prominent within library and information sciences related journals and scholarly publications. Originally developed in response to the availability of online resources, Thomas (2005, as cited in Ipris, 2010, p. 533), stated that transliteracy is “the ability to read, write and interact across a range of platforms, tools and media from signing and orality through handwriting, print, TV, radio and films, to digital social networks.” She also goes on to comment that transliteracy is a move toward “a unifying ecology of not just media, but of all literacies relevant to reading, writing, interaction and culture.” The essential idea is that transliteracy is concerned with mapping meaning across different media and not with developing particular literacies about various media. It is not about learning text literacy and visual literacy and digital literacy in isolation from one another but about the interaction among all these literacies. Jaeger (2011) asserts that the term ‘transliteracy’ evolved from the need to describe the changing nature of communication in a digital context. Jaeger defines transliteracy as “... the ability to read, write and interact across a range of physical and virtual platforms...” (p. 44). Although similar to Thomas’ perspective, Jaeger’s view places a greater emphasis on “... the role of school librarians to evaluate materials in the transliteracy process for meaning, and reliability” (p. 44).

The term ‘digital literacy’ surfaced in the late 1990s as “...the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers” (Gilster, 1997, p. 1, as cited in Coulter, 2001, p. 84). The term has similar properties to information literacy in that there is reference to “... the ability to understand, evaluate, and integrate information in multiple, computer-delivered formats” (Pool, 1997, p. 6). Early definitions of digital literacy put the focus on information and did not take into account the way in which information was used for entertainment and communication. More recently there has been a

shift towards considering digital literacies within the context of contemporary cultural practices afforded by the internet, such as online gaming, advertising, and publication of videos via podcasts (Buckingham, 2008).

The terminologies – multimodal, multiliteracy, transliteracy, and digital literacy – are similar in meaning to information literacy, but appear to be largely uni-dimensional, in that they pay attention to selected information literacy skills and attributes, as opposed to the ‘whole’ concept that encompasses information literacy. That is, the term information literacy has undergone extensive dialogue, debate, interrogation and interpretation of the multiple skills and attributes in the form of a variety of conceptual models and frameworks previously discussed in this chapter. This is inclusive of Bruce’s 1997 *The Seven Faces of Information Literacy* conceptual model, and *The Seven Pillars of Information Literacy* developed by the SCONUL (1999). Subsequent frameworks such as the highly cited *Australian and New Zealand Information Literacy Framework* (ANZIL) (Bundy, 2004), and more recently the *Information Literacy Framework for Hong Kong* (2005) developed by the EMB, and the *Learning Standards for the 21st Century* (2007), developed by the AASL, have contributed to a comprehensive understanding of the multilayered ‘segments’ contained within the ‘whole’ concept of information literacy.

Of additional note, is the inclusion of Information Communication and Technology (ICT) competence within the six identified General Capabilities overarching the Australian Curriculum Version 3.0, which are similarly aligned to information literacy skills, yet, the term ‘information literacy’ is absent:

Students develop ICT competence as they learn to use information and communication technology effectively and appropriately to access, create and communicate information and ideas solve problems and work collaboratively in all learning areas at school, and in their lives beyond school. (ACARA, 2011b, p.21)

It could be argued that this inclusion is a cursory glance towards information literacy, but falls short of incorporating the whole concept of information literacy as a complex array of process driven and higher order thinking skills.

TECHNOLOGY IN AUSTRALIA

Digital Technologies: A Snapshot of Access and Use of Technology in Present Day Australia

The Australian Bureau of Statistics (ABS) recently reported that the percentage of Australian households with access to the internet at home has continued to increase, from 64% in 2006-07 to 79% in 2010-11” (2011). Evidence also suggests that children in Australia of primary and secondary school age are regularly accessing and using digital technologies at home and at school. A survey of 2.7 million Australian

children aged 5 -14 years, reported that 79% of children used the Internet, with home as the most common place for Internet use (73%), and school cited as the second most common (69%) (ABS, 2009). The report also identified ‘educational activities’ (85%), as the most common use for computers and the Internet by children. These statistics are aligned to findings made by Mills (2010, p. 253) who concluded that “...digital media are changing the way young people learn, play, socialize, and participate in civic life across multiple social contexts.”

The launch of the Digital Education Revolution (DER) in 2008 by the Australian Federal Government signalled an intention to improve the connectivity (Internet speeds) and computer to student ratios of secondary, and to a lesser extent, primary schools in Australia (Department of Employment Education and Workplace Relations [DEEWR], 2011). In addition, the introduction of the National Broadband Network has the potential to improve these further (Stack, Watson, & Abbot-Chapman, 2011). The increased ease of access to information in electronic formats further emphasises the need for the concurrent teaching and assessment of information literacy skills within the primary and secondary curricula.

FUTURE IMPLICATIONS

More Access, More Information, More Knowledge?

There is clear evidence that Australian children are routinely accessing and using digital technologies as a source of information within educational learning contexts. Students currently have access to greater quantities of information, from a wide and uncontrolled authorship (Bruce & Candy, 2000; Bundy 2004; Probert 2009). The prevalence of digital technologies and Australian children’s access to and use of these technologies at home, and within schools appears to be extensively documented, yet research and discourse in relation to the teaching and learning of information literacy skills within the primary and secondary arena, continues to remain elusive.

There is collective agreement within the literature that increased access to a greater quantity of information does not simply equate to a more knowledgeable, informed society (Bundy, 2004; Cox & Lindsay, 2008; Moore, 2006; Pegrum, 2008; Probert, 2009). Marcoux accurately noted a decade ago that “...mere access to information does not ensure knowledge. Knowledge grows through acquiring information, evaluating and using information effectively” (1999, p. 13).

Research leaders within the field such as Bruce (1997; 2003; 2004), Bruce and Candy (2000), Bundy (2004), and Moore (2005, 2006) have consistently advocated that students need to be taught how to manage, access, filter, analyse, and critique information in digital contexts. To date, the tertiary education sector has undertaken the task of integrating information literacy skills and strategies throughout the curriculum, predominately underpinned by the ANZIL (Bruce; 2004). Conversely, there remains a deficit of research on information literacy within the primary

and secondary education sectors. It is therefore advocated that further research be conducted, specifically with a focus on quantifying the information literacy skills and abilities of primary and secondary students, studying the information literacy content knowledge of teachers, and investigating the current and potential information literacy teaching, learning and assessment strategies by primary and secondary educators.

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PROGRESS IN VIDEO-BASED INTERVENTION FOR INDIVIDUALS WITH AUTISM: IMPACTS OF IMITATION SKILLS AND MODEL TYPES

CHARACTERISTICS AND PREVALENCE OF AUTISM

Without effective intervention, individuals with autism (and their families) can expect a compromised quality of life. The American Psychiatric Association (APA) (2000) described three primary behavioural characteristics which inform a diagnosis of Autistic Disorder: (1) qualitative impairment in social interaction; (2) qualitative impairment in communication; and (3) restricted repetitive and stereotyped patterns of behaviour, interests, and activities. Though there is considerable variation in the levels of adaptive function among individuals with autism, people with this developmental disorder often have difficulty with the adaptive and daily living skills associated with functioning independently at school, at home, and in the community living (APA, 2000; Minshawi, Ashby, & Swiezy, 2009). Individuals with autism may exhibit behavioural symptoms such as hyperactivity, short attention spans and impulsivity (APA, 2000), and the academic achievement of students with high-functioning autism and Asperger's syndrome is frequently below that which would otherwise be expected on the basis of their intellectual abilities (Estes, Rivera, Bryan, Cali, & Dawson, 2011).

Some uncertainty persists regarding the etiology of autism. According to Trottier, Srivastava, and Walker (1999), "the prevailing view is that autism is caused by a pathophysiologic process arising from the interaction of an early environmental insult and a genetic predisposition" (p. 103). That autism is a strongly genetic disorder, as originally proposed by Kanner (1943), has been supported by research suggesting a heritability value of about 90% (Gupta & State, 2007; Shastry, 2005).

The prevalence of people being diagnosed with autism is increasing. The APA (2000) reported median rates of five diagnoses per 10,000 with males having diagnosis rates of up to five times higher than females. But Wing and Potter (2002) reported prevalence rates of up to 60 per 10,000 individuals for autism and higher for all the autism spectrum disorders (ASD) for some cohorts. According to MacDermott, Williams, Ridley, Glasson, and Wray (2007), the prevalence rate of 62.5 per 10,000 individuals represented about 125,000 people in Australia. Research published in 2004 recorded that the prevalence of children identified with autism had increased ten-fold over a period of 16 years in the Barwon region of

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Victoria (Icasiano, Hewson, Machet, Cooper, & Marshall, 2004). These findings are consistent with data from the USA and the UK (Williams, Mellis, & Peat, 2005; Yeargin-Allsopp et al., 2003). Although there is some consensus regarding the increase in prevalence of autism, researchers do not know what is causing this increase (APA, 2000; Bristol et al., 1996; Metz, Mulick, & Butter, 2005; Wing & Potter, 2002). Whether or not there has been an increase in actual incidence, the increase in prevalence of autism, both internationally and in Australia, means that more families and individuals are seeking relevant support services in response to a diagnosis of autism.

VIDEO-BASED INTERVENTION

The difficulties that autistic symptoms can present to the individual and to others as well as the prevalence of the disorder have encouraged a number of different approaches to intervention (Green et al., 2006). Because autism is believed to be due to atypical development in the early embryonic stages of an individual's life, pharmacological interventions cannot 'cure' autism (Metz et al., 2005; Rapin, 2002). Medication can assist with reducing aggressive, self-injurious, inattention-related and stereotypic behaviours and can thus enhance the effectiveness of educational intervention (Bristol et al., 1996; Metz et al., 2005; Rapin, 2002; Roberts & Prior, 2006; Volkmar, 2001). As Green et al. (2006) demonstrated, many of the commonly used treatments for individuals with autism lack empirical support. Thus, there is a need for researchers to identify and promote evidence-based practices to inform intervention programs for individuals with autism (Jacobson, Foxx, & Mulick, 2005). One approach to teaching individuals with autism that has been supported by recent research involves the presentation of relevant video-footage (Bellini & Akullian, 2007). Video-based intervention (VBI) involves the presentation of video footage to a learner as an antecedent to the performance of relevant behaviours. In most procedural types of VBI, the video footage depicts a model (such as an adult, a peer, a sibling, or the participant themselves) performing a target behaviour.

Before the technology currently used for VBI (such as the digital video camera and laptop computer used in this research) was widely available, modelling itself was a well-established vehicle for learning. According to Bandura (1986):

through the years, modelling has always been acknowledged to be one of the most powerful means of transmitting values, attitudes, and patterns of behaviour. (p. 47)

Using currently available technology as the medium to teach adaptive behaviours can be viewed as the logical extension of observational learning theory as proposed by Bandura (Bellini & Akullian, 2007; Nikopoulos & Keenan, 2006).

VBI has been considered to be particularly relevant for individuals with autism because of the relative strengths in visual processing they often possess (Rayner,

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Denholm, & Sigafoos, 2009). Although a number of procedural types of video-based intervention (VBI) such as video modelling and video prompting have been used effectively for a range of target behaviours, Rayner et al. (2009) argued that important questions about this approach still remained unanswered. Previous literature has suggested that imitation and attention skills were likely to be prerequisites for effective VBI (McCoy & Hermansen, 2007; Rayner et al., 2009; Sherer et al., 2001; Sigafoos, O'Reilly, & de la Cruz, 2007). Few studies, however, have reported on these participant characteristics or their influence upon the effectiveness of VBI. Also, studies have effectively used various types of model (self, sibling, peer, and adult) as part of VBI procedures for teaching individuals with autism but with few comparative studies, no clear and consistent differences in the effectiveness of these model types had been identified (Rayner et al., 2009).

AIMS OF THIS RESEARCH PROJECT

To further enhance the effectiveness of VBI for students with autism, the aim of this project was to investigate the conditions in which VBI is more likely to succeed and the conditions in which it is less likely to succeed. Within this broader aim, there were two primary research questions that this project examined: (1) Can a measure of a participant's imitation ability be used to predict the suitability and the effectiveness of VBI for children with autism? (2) Which model types are more effective as part of VBI for children with autism: adults or peers and siblings? In addition to exploring answers to these questions, this project provided opportunities to explore the relative effectiveness of VBI and backward chaining as well as the impact of other variables on the effectiveness of VBI, such as target behaviours and the participants' levels of adaptive functioning.

METHODS

This project was designed within an applied behaviour analysis (ABA) research framework. Among the intervention approaches available, a number of researchers have concluded that procedures informed by the principles of ABA have been the most effective for promoting behavioural changes that enhance the quality of life for individuals with developmental disabilities, such as autism (Green et al., 2006; Jacobson et al., 2005; Keenan, 2006; Lovaas, 1987; Nikopoulos & Keenan, 2006). The field of ABA has developed from the theoretical foundations of behaviourism (Cooper, Heward, & Heron, 1987). According to the report of the Surgeon General on mental health issues in the United States, "Thirty years of research demonstrated the efficacy of applied behavioural methods in reducing inappropriate behaviour and in increasing communication, learning, and appropriate social behaviour! (US Department of Health and Human Services, 1999, p. 163).

Approval was granted by the Tasmanian Human Research Ethics Committee (HREC) and the Department of Education (Tasmania) to work with school-aged

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children who had a diagnosis of autism prior to participation in this project. Diagnoses were provided by multi-disciplinary teams, recognised by the Department of Education, Tasmania, and were consistent with the definition of autism stated by the DSM-IV-TR (APA, 2000). Approval was contingent upon informed consent from the participating students' parents, teachers, and principals as well as similar informed consent for the students who acted as models (peers or siblings) for the videos used in the interventions. Following a review of relevant literature (Rayner et al., 2009), three intervention studies based on multiple-baseline research designs (Horner et al., 2005; Kennedy, 2005; Kratochwill & Levin, 1992) were conducted as part of this project (see [Table 1](#)). The reader is encouraged to access the published case-reports (Rayner, 2010, 2011a, 2011b) for further details on the methods used in the individual studies of this project.

Pre-baseline Data Collection

Prior to intervention, all participants in the three studies were assessed in terms of their: (a) autistic impairment, using the Childhood Autism Rating Scale (CARS) (Schopler, Reichler, & Renner, 1988); adaptive behaviour profile, using the Vineland Adaptive Behaviour Scales (VABS) Second Edition (Sparrow, Cicchetti, & Balla, 2005); and their imitation skills, using a novel procedure informed by the Imitation Disorders Evaluation (IDE) scale (Malvy et al., 1999). A summary of participants' autistic impairment, adaptive behaviour age equivalent, and imitation skills assessed using these measures is included in [Table 1](#).

Imitation Assessment

Following interviews with a parent, teacher, and teacher aide about the imitative behaviours of the participant, a video-based assessment of imitation was conducted for each individual. The imitation sequences included in this assessment were delivered via video, displayed on a laptop computer. The resulting video consisted of two sets of five opportunities for the participant to respond to the first six items of the IDE: (1) imitation of facial expressions; (2) visual pursuit; (3) imitation of gestures; (4) imitation of sounds/words; (5) imitation of actions with objects; and (6) imitation of amusing actions. The video featured only the author, who was unfamiliar to the participants prior to the commencement of the study. Brief written and verbal instructions were provided as an introduction to the video, which was 9 minutes and 57 seconds of duration in total. The video was presented using Windows Media Player®. If the participant stopped looking at the computer screen, the researcher paused the video and prompted him to attend by saying, "Okay Regan, watch this" or words to similar effect, before resuming the video. The number of appropriate imitations was recorded during the session.

Table 1. Summary of the three intervention studies conducted as part of this project

Reference	Participant		Appropriate imitations from 60 opportunities in the video-based assessment	Target behaviour/s	Model type/s in the YBI	
	Name* (used with written consent) or pseudonym	Diagnosis				Adaptive age equivalent (years : months)
Rayner (2010)	Regan*	Severe autism	2:9	34	Unpacking bag, packing bag (generalisation probe), tooth brushing	Adult model
Rayner (2011a)	Matthew	Severe autism	3:8	11	Coin matching, verbal responses during circle time, preparing noodles	Adult and sibling models
Rayner (2011b)	Nick	Mild autism	6:3	60	Tying a shoe lace knot	Adult and peer models
	Kayden	Mild autism	6:2	60	Tying a shoe lace knot	Adult and peer models
	Sean	Severe autism	4:1	42	Tying a shoe lace knot	Adult and sibling models

METHODS FOR THE THREE STUDIES

In the first intervention study of this project (Rayner, 2010), the imitation assessment procedure was used and the utility of video modelling procedures to teach Regan, a 12-year-old boy with autism, to complete two daily living skills was explored. The daily living skills were: unpacking his school backpack upon arrival at school, and brushing his teeth. The participant's obsessive and ritualistic patterns of behaviour were noted to have hindered his completion of the unpacking task for approximately one and a half years prior to the intervention. The videos used by Rayner (2010) featured an adult model (the author) (see [Table 1](#)).

In the second study (Rayner, 2011a), the same imitation assessment was used and a video modelling intervention was implemented in an attempt to teach three target behaviours to Matthew, a 15 year-old boy with autism. Using an alternating treatments tactic (Johnston & Pennypacker, 1980; Kennedy, 2005), this second study compared adult-as-model and sibling-as-model conditions to teach a daily living skill (preparing a snack of noodles), a communication skill (verbal responses in circle time), and an academic task (matching coins with their labels).

In the third study, after assessing the participants' imitation ability, Rayner (2011b) endeavoured to teach three boys with autism (Nick, Kayden, and Sean, aged 10, 9, and 9, respectively) to tie a shoelace knot. The video prompting intervention compared the use of peer-as-model (two participants) and twin sibling-as-model (one participant) conditions with an adult-as-model condition (all three participants). The video prompting intervention involved participants watching segments of the target behaviour being performed successfully before having an opportunity to complete the relevant steps of the target behaviour themselves. Using the multiple-baseline design, the video prompting procedures were compared with backward chaining procedures (for all three participants). By definition, backward chaining is a procedure in which the participant (or student) is taught to complete the last step of the behaviour chain first, then the second last, and so on. This approach enables the participant to receive the reinforcement associated with completing the target behaviour before they have been able to perform the whole sequence independently (Alberto & Troutman, 2006; Cooper et al., 1987).

DATA ANALYSIS

Consistent with the recommended data analysis methods for single-case research designs (Kennedy, 2005; Kratochwill & Levin, 1992), visual analysis of the graphed data was the primary method of data analysis to determine whether a functional relationship was demonstrated between the independent variables and the dependent variables in each of the three studies in this project. Visual analysis has been described as a conservative method of evaluating behavioural change and involves an inspection of the level, trend, variability, and consistency of data within and between experimental phases (Cooper et al., 1987). Visual analysis allows the data

to be interrogated during the experimental phases of a study after each observation period, enabling the researcher to modify the independent variable where necessary (Cooper et al., 1987; Horner et al., 2005). The ability to evaluate the effect of the VBI (independent variable) upon the participant's observed behaviour (dependent variable) during the experimental phases, as well as upon completion, was important for this research project. This was because fading or modifying the intervention in response to the participants' responses across the sessions was necessary for each participant within the three VBI studies of the project.

The reader is encouraged to access the individual case-reports (Rayner, 2010, 2011a, 2011b) to view the graphs and for in-depth information regarding the intervention results for each participant. The purpose of this chapter is to bring together the findings from these three related studies to address the two primary research questions. Single-case research designs are somewhat limited in terms of their ability to justify conclusions about the relationships under investigation with reference to a broader population. Meta-analyses and systematic literature reviews of intervention studies using single-case research designs assume an important role in determining evidence-based practice for this reason (Bellini & Akullian, 2007). Although the implementation of three single-case research studies does not, by itself, provide sufficient data for a meta-analysis, replicating the use of the imitation assessment across all three studies and the comparing different model types across two of the three studies have enabled greater confidence in the generality of the findings than that which would have been warranted by the individual studies in isolation (Horner et al., 2005). Thus, while a visual analysis of graphed (quantified) data was performed for the individual studies, this chapter presents the overall results as a qualitative synthesis of key findings.

RESULTS

The key findings across the three studies were that: (1) the effectiveness of the intervention appeared to be positively related to the participant's assessment imitation ability; and (2) there did not appear to be any difference in the effectiveness of the various types of models used in the video-based interventions (VBI). As reported by Rayner (2010), Regan consistently imitated gestures, actions with objects, and amusing actions; subsequently, data indicated that Regan responded positively to the video modelling interventions. In particular, rapid acquisition of the morning unpacking his school bag task was observed and he even generalised his learning of this skill to his performance of the afternoon packing his school bag task, for which no video modelling intervention was provided. In contrast, Matthew's limited gains with all three target behaviours as a result of the video modelling interventions may have reflected his low level of responsiveness to imitative opportunities, as suggested by (Rayner, 2011a). That Matthew was assessed to have the same level of autistic impairment and a slightly higher overall adaptive age equivalent than Regan

strengthens the argument that there is an important relationship between imitation ability and the effectiveness of VBI.

The data reported by Rayner (2011b) were also consistent with the hypothesis that imitation ability is a prerequisite for the effectiveness of VBI, with strong imitation assessment skills and identifiable changes in performances of the target behaviour observed for Nick and Kayden. In contrast, Sean was assessed to have comparatively weaker imitation skills and the VP procedures made little, if any socially significant difference in his performance of the shoelace knot tying task. It should be noted that unlike the participants in the study of Sherer et al. (2001), the participants in the study of Rayner (2011b) were not comparable in language or adaptive behaviour level. Compared with Nick and Kayden, Sean was limited in terms of verbal communication, was approximately 2 years lower in his level of adaptive behaviour, and had a more severe autistic impairment. It is worth noting that when Sean's performances in the imitation assessment are compared with those of Regan, it would be reasonable to suggest that Sean could indeed benefit from VBI in acquiring daily living skills that do not require the same fine-motor and cognitive demands as the shoelace tying task.

For Matthew (Rayner, 2011a) and Sean (Rayner, 2011b), there were no reportable differences between the effectiveness of the sibling-as-model and adult-as-model conditions. Similarly, for Nick and Kayden (Rayner, 2011b), there were no reportable differences between the effectiveness of peer-as-model and adult-as-model conditions. Also, data reported by Rayner (2011b) suggest that the backward chaining procedures were more effective in teaching the three participants to tie a shoelace knot than the video prompting procedures, particularly for Nick and Kayden.

DISCUSSION

Project Synthesis

Few other VBI studies have involved an assessment of participants' imitation skills (Hine & Wolery, 2006). Some studies have involved the assessment of attention skills (Nikopoulos & Keenan, 2003, 2004), and other studies have described specific prerequisites (Branham, Collins, Schuster, & Kleinert, 1999; Sigafos, O'Reilly, Cannella, et al., 2007; Sigafos et al., 2005). This project involved the adaptation, implementation, and evaluation of an innovative video-based imitation assessment procedure that is brief, informative, and relevant for supporting the decision making around the suitability of VBI for particular individuals with autism. Together, data from this assessment procedure and data relating to the effectiveness of the VBI for the participants were consistent with the general hypothesis that imitation skills are a prerequisite for effective VBI. The research suggests that, all other things being equal, individuals assessed to have more developed imitation skills are more likely to acquire target behaviours more rapidly than individuals with less developed imitation

skills through this intervention approach and that an assessment of imitation ability can help predict the effectiveness and suitability of VBI for a particular individual.

Implications for Practice

The findings of this research should encourage practitioners to evaluate the prerequisite imitation skills of individuals prior to deciding if and how VBI should be implemented. More specifically, this research supports the use of direct observations of a video-based imitation assessment procedure based on the first six items of the IDE (Malvy et al., 1999). An individual's overall performance on an imitation assessment together with data indicating areas of strength and weakness, such as actions with objects or facial expressions, could be useful in designing effective interventions. If the imitation assessment indicates that the participant does not have the prerequisite skills necessary for a specific VBI, practitioners should consider other intervention approaches or target imitation skills directly. Interestingly, a recent study has shown that an intervention package including video modelling was effective for teaching generalised imitation skills to a young child with autism (Kleeberger & Mirenda, 2010). Thus, as well as being a suitable choice of intervention for those who demonstrate sufficient imitation skills, VBI may also be helpful for developing the skills of imitation that are a prerequisite for individuals to be able to learn other important behaviours. As Kleeberger and Mirenda (2010) suggest, because imitation is an important pre-communication skill and is one of the core deficits in children with autism, future research should continue to explore the relationship between imitation and VBI and the potential of the use of educational technologies to promote generalised imitation skills in this population.

For the combination of participants and target behaviours of the VBI studies of this project, the type of model involved in the intervention seemed to be inconsequential. Thus, while previous research has found no difference in the relative efficacy of self-as-model and other-as-model procedures (Bellini & Akullian, 2007; Sherer et al., 2001), this research reports a similar finding in relation to adult-as-model and sibling-as-model or peer-as-model procedures. This research also indicates that in some contexts, other aspects of the intervention, such as the appropriateness of the resources used and the reinforcement contingent upon performance of the target behaviour, may have greater influence on the success of VBI than the choice of model. With the comparisons of model types involving only four participants, four target behaviours, and two independent studies, further VBI studies with single-case research designs comparing adult, peer, and sibling models would be needed to support the external validity and generality of the present findings (Campbell & Stanley, 1966; Horner et al., 2005).

The finding that no clear or consistent differences emerged between the effectiveness of the different model types used as part of a VBI is enabling rather than constraining. This finding suggests that practitioners should consider the type of model within the context of their specific circumstances. Practitioners may choose

to make use of self-as-model procedures where the target behaviour to be increased is already present within the participants' repertoire. Also, as demonstrated in the studies of Houlihan, Miltenberger, and Larson (1995) and Maione and Mirenda (2006), self-as-model procedures may be appropriate for following up on behaviours that were previously taught using other approaches. Peer models may be particularly relevant for situations in which a lack of self-efficacy is thought to be a constraint on the participant's performance of the target behaviour, or in situations where the target behaviour needs to become more socially acceptable from the perspective of the participant. Sibling models may be appropriate for interventions to be conducted in homes or generalised to home settings. Sibling models may also be appropriate where the social benefits for the model, as well as the acquisition of the target behaviour by the participant, are deemed to be an important aspect of the intervention. Including siblings as models in VBI could allow the sibling to be more involved in the education of the participant with a disability.

An interesting finding reported by Rayner (2011b) is that all three participants made greater gains regarding the shoelace tying target behaviour during the backward chaining procedure than during the video prompting procedures. Although several studies have noted the benefits of other procedures as part of a VBI package (Alcantara, 1994; Apple, Billingsley, & Schwartz, 2005) and found video modelling to be more effective than live modelling (Charlop-Christy, Le, & Freeman, 2000), the study of Rayner (2011b) provides an example where a backward chaining procedure (including live modelling and verbal prompting) was more effective than a VBI. The finding that backward chaining was more effective for teaching tying a shoelace knot to Nick, Kayden, and Sean suggests that although a participant may have the necessary prerequisites to benefit from VBI, some target behaviours would be taught more effectively through the use of other traditional approaches informed by the principles of applied behaviour analysis. Therefore, although this chapter argues that VBI is an important strategy that practitioners may find useful, other evidence-based practices should also be considered when selecting the most suitable intervention approach for a specific target behaviour.

FUTURE RESEARCH DIRECTIONS AND APPLICATIONS OF VBI

Further research would be beneficial to evaluate the generalisability of findings reported in this chapter. Ideally, such studies would target the same or comparable behaviours for intervention and involve a number of participants assessed to have comparable IQ scores, language skills, adaptive behaviour age equivalents, and severity of autistic impairment but who vary in terms of their assessed imitation skills.

Another potentially useful direction for research is to explore ways in which VBI can become more accessible, practical, and socially acceptable. Previous research has reported benefits of video prompting for teaching students with autism to operate video recorders and personal computers (Le Grice & Blampied, 1994). More recently, in the study by Cihak, Fahrenkrog, Ayres, and Smith (2010),

four students with autism learned to operate an iPod and then used this device to present videos to assist them in making transitions around their school. Similarly, Kagohara (2011) taught students with developmental disabilities to access videos on an iPod (for entertainment purposes). Thus, one exciting direction for VBI and related interventions, particularly as they relate to the use of portable touch-screen technologies, is the potential for children with autism to independently access tools to support their own learning through technologies that are socially acceptable for their typically developing peers. For example, Kagohara, Sigafos, Achmadi, O'Reilly, and Lancioni (2012) used video modelling delivered through an iPad to teach children with autism spectrum disorders to spell-check. Further efficiencies for VBI are afforded by the iPad, as these portable touch-screen technologies allow for video capture, video editing, and video viewing (see <http://www.apple.com/au/apps/imovie/>). This could represent a significant saving and increased mobility compared with previous technologies used for VBI (television, video camera, and VHS player or digital video recorder and laptop computer). With the power of observational learning combined with the opportunities afforded by emerging technologies, a number of future applications for the effective use of VBI procedures to enhance the quality of life for individuals with autism are possible.

CONCLUSION

In summary, VBI can be an effective approach for teaching important skills to individuals with autism. An assessment of imitation ability can be useful in predicting the likelihood that VBI will be an effective approach for a particular individual. A student's imitation abilities are required, but do not guarantee, the success of VBI for all target behaviours. Any differences between the effectiveness of the use of different model types (such as adults, peers, and siblings) appear to be contextual rather than general. The development, refinement, and implementation of evidence-based teaching approaches, such as VBI, are important for enhancing their quality of life for individuals with autism, as well as the quality of life of their family, school, and community. The continued exploration of popular technologies in the education of individuals with autism will no doubt increase the accessibility and enhance the effectiveness of a range of teaching strategies for this population.

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THE USE OF INTERACTIVE WHITEBOARDS IN EDUCATION: OPPORTUNITIES AND CHALLENGES

Interactive white boards (IWBs) have been heralded by many as a valuable teaching tool offering innumerable opportunities for increasing student engagement and learning (Campbell & Kent, 2010; Glover, Miller, Averis, & Door, 2005). Although research clearly shows IWBs have the potential to transform the way in which teachers teach (Glover et al., 2005), this potential is not realised simply by their installation into a classroom setting. There is also a growing realisation that even when teachers intend to use IWBs as a transformative pedagogic tool, lack of practical skills and methodological training can frustrate and impede progress (Goodwin, 2011; Greiffenhagen, 2000; Smith, Higgins, Wall, & Miller, 2005). Thoughtful strategies are required to cultivate teachers' use of technology and schools that plan ahead are more likely to be successful in this endeavour (McKenzie, 2002). Betcher and Lee (2009) liken the introduction of IWBs to classrooms today, to the revolutionary introduction of blackboards in 1801; teachers had to learn how to use them, and this use evolved over the following 200 years. In relation to IWBs, they commented:

The real challenges for teachers at this point in the development of digital classrooms are to see the great potential that lies ahead, to master the tools and the mindset to begin claiming that potential, and to collaborate with their colleagues and students to effectively use these new tools for teaching in a digital world. The IWB has all the characteristics for being a potent tool in this educational shift. (Betcher & Lee, 2009, pp. 1-2)

This chapter provides an overview of IWBs, reviews research on the technological know-how and pedagogy needed to support their use, and examines the stages of teachers' IWB use according to Goodwin's (2011) continuum. It considers instrumental genesis, explores influential variables that may affect a teacher's use of IWBs and theoretical frameworks, and concludes with a discussion regarding the use of IWBs in pre-service teacher education.

WHAT IS AN IWB?

An IWB (also known as an electronic or digital whiteboard) is typically a large, white, touch-sensitive board designed to replace the traditional blackboard or whiteboard. It has been described as a "digital hub through which other technologies can be channelled" (Warwick, Mercer, Kershner, & Kleine Staarman, 2010, p. 350);

it has the capacity to display and respond to a limitless range of projections, internet resources, and software applications through its connection to a data projector and computer. IWBs can be either fixed in a permanent, prominent position, or free-standing for mobility.

There are many different brands that use different types of technology. Some use a flexible, “analogue resistive membrane technology” (Betcher & Lee, 2009, p. 26) with a fine mesh of contact points that detect pressure and relate directly to the computer’s screen pixels. Others use “electromagnetic pick up technology” (p. 27), which registers the position of a stylus via a grid of electronic sensors set into a hard surface. There are also ultrasonic and infrared tracking technology systems. This is not a comprehensive list, however all are operated by a special pen or stylus or a single finger touch, and some respond to two touch points at once.

The position of the data projector varies from a direct attachment to the top of the IWB, to a position several metres away, and may be fixed in position or free standing. The position of the data projector and where the classroom is situated affects how frequently the IWB requires calibration, or realignment of the data projector in relation to the IWB. It is also possible to operate a virtual whiteboard through the use of an interactive projector which recognises the position of an infrared pen on a surface. As well as projectors there are numerous attachments available for IWBs. These include speakers, slates or tablets, wireless graphic pads or other mobile technologies, printers, document cameras, and interactive response systems.

EBoards are a newer but related technology that feature a high resolution, flat panel, back lit, Liquid Crystal Display (LCD) touch screen that closely resembles a large black plasma television. Problems with user shadows and varying lighting conditions that often affect the ease of use of IWBs are negated, as is the need for calibration. Depending on the size, brand and software, these may respond to either single or dual touch. For the purposes of this review eBoards are encompassed by the term, IWBs.

The potential of IWBs as teaching tools arises from the myriad of ways they provide to

view manipulate, create and distribute electronic teaching and learning resources using familiar computer applications (and) connect to desktop and networked computers, combining the functionality of audio-visual presentation and computer-based interactivity. (Bennett & Lockyer, 2008, p. 289).

Hartson (2003) conceptualises these types of visual, auditory and tactile human-computer interactions as cognitive, physical, sensory, and functional affordances. IWBs can be viewed as a generic classroom tool, but when linked to the internet, “it is an unrestricted portal for interaction with an infinitely wide range of secondary digital resources... offer(ing) teachers tremendous ease and flexibility in sourcing materials to stimulate dialogue” (Hennessy, 2011, p. 476).

There are four categories of software available for supporting the use of IWBs in classrooms. The first is specialised IWB software packages which are restricted to use

on specific brands of IWBs, while the second is specialised IWB software packages that can be purchased for use on any brand. The third category relates to the immense range of commercially available software programs that are not specifically written for IWBs, but have the potential to capitalise on the interactivity afforded by IWBs. The fourth category is similar to the third; however it covers the plethora of suitable freeware. Common threads found in many of these software options are key features and tools such as the ability to touch and drag objects, to highlight, write or add text, to add objects, shapes and links, and to embed multimedia such as video or sound files. According to Betcher and Lee (2009), these common threads are important enablers for encouraging teachers to move between the various brands of IWBs and related software programs. They also suggest that most people only use about 10% of the functionality of Microsoft Word, with many clever features going to waste. To avoid this type of underutilisation of IWBs, it is important for teachers to explore the available software in order to attain a greater level of proficiency, thus enabling more opportunities for both planned interactivity and spontaneous learning.

By June, 2011, over 3.6 million IWBs were installed across 66 developed countries worldwide. The United Kingdom government spent over AUD\$76 million on this venture (Armstrong, Barnes, Sutherland, Curran, Mills, & Thompson, 2005), and as the result, over 70% of classrooms are now equipped with IWBs (Futuresource, 2011). Although IWBs are present in most Australian schools (Campbell, 2010), only approximately 30% of classrooms are fitted with the technology, while in the United States, the comparable figure is 35% (Futuresource, 2011). It appears that the governments and other bodies providing the funding for this technology do so under the assumption that students would benefit from its use (Glover et al., 2005; Slay, Siebörger, & Hodgkinson-Williams, 2008). IWBs are becoming a regular part of the technological toolkit available to teachers; however teachers need both the technological know-how, and the appropriate teaching pedagogy, to reap the benefits of this technology.

IWBs AND TECHNOLOGICAL KNOW-HOW

Whilst supporting IWBs as a valuable teaching tool, a recent Australian study concluded that teachers must have adequate operational competency and sufficient technical know-how to be “competent and effective users of IWBs” (Campbell & Kent, 2010, p. 447). Similar research in the UK (Beauchamp, 2004; Smith et. al., 2005) identified that a lack of skill and training regarding basic trouble shooting of IWB issues caused a negative impact on teaching and learning. Although the installation of IWBs into classrooms was met with great enthusiasm (Kennewell, 2006), the lack of technological skills to calibrate an IWB, inadequate trouble-shooting skills, such as checking that everything was plugged in properly, or not knowing how to replace the batteries in the pens or reconnect a wireless tablet, wasted time and caused frustration for both students and teachers (Levy, 2002). According to Beauchamp’s (2004) case study of the implementation of IWBs into a primary

school, those sorts of issues can be alleviated by gradually building up teachers' technological skills. Beauchamp's findings also suggested that the development of basic "mechanical skills" (p. 330) was a necessary step for teachers to take if they were to further develop their IWB skills.

Cuthell (2003) reported that teachers with strong technological skills were the most enthusiastic and keen IWB users. Unfortunately, practical technical issues beyond a technologically savvy teacher's reach, such as networking problems, intermittent wireless access, slow logons and problematic IWB-dedicated pens and other hardware items, are still likely to occur (Levy, 2002). A reliable and readily available support network is vital (Campbell, 2010), as there is evidence that technical support is a major concern for both students and teachers (Levy, 2002), which may lead to a negative impact on teaching efficiency (Smith et al., 2005).

TEACHING PEDAGOGY

In addition to adequate technical skills, teachers need pedagogical understanding of effective IWB usage. IWBs make it possible to capitalise on a wider range of teaching materials than ever before, integrating web-based resources, multimedia, and text and images to create dynamic, interactive and inspiring learning experiences (Campbell & Kent, 2010). However, IWBs merely provide the medium for interactive learning and rely on the teacher for the degree and manner in which interactivity is afforded:

Teachers are critical agents in mediating the software; the integration of the software into the subject aims of the lesson and the appropriate use of the IWB to promote quality interactions and interactivity. (Armstrong et al., 2005, p. 468)

IWBs do not instantly change the way a teacher teaches; in fact, it is typical for the interactivity of this technology to be lost at first (Jewitt, 2006). Initially, the board is typically used in a manner that is reminiscent of regular whiteboard use, and the projector used in typical projector/screen fashion; indeed, it is not uncommon to find an IWB standing alongside a regular whiteboard (Jewitt, 2006; Campbell & Kent, 2010).

One of the main pedagogical implications of having an IWB in the classroom, is the opportunity it provides teachers to plan learning experiences, especially with regard to "what is done and who does what" (Jewitt, 2006, p. 143). Research has shown that "the use of technology as an adjunct, rather than as an integrated element in teaching, minimises interaction and the matching of teaching to the learning needs" (Greiffenhagen, 2000, p. 1). When IWBs are not used in an interactive manner, the result may be a reinforcement of a didactic teaching approach (Levy, 2002; Kennewell, 2005; Knight, Pennant, & Piggott, 2004; Gillen, Kleine Staarman, Littleton, Mercer, & Twiner, 2007). Furthermore, it is critical to understand that students may not necessarily be cognitively engaged simply by viewing or touching

images, animations or videos projected onto an IWB. Teaching strategies need to be carefully considered to optimise student learning (Goodwin, 2011).

STAGES IN TEACHERS' IWB USE

Drawing upon the work of Glover, Miller, and Averis, (2004), Beauchamp (2004), and Sweeney (2008), Goodwin (2011) defined a continuum of user level competencies that teachers exhibit in their pedagogical use of IWBs. This continuum provides a tool for self-assessment by teachers wishing to become more proficient at using IWBs, or for schools looking at IWB related professional learning. The five stages identified by Goodwin form the framework for this section of the review.

Substitution

The initial 'substitution' stage is typified by lecture style, teacher-directed learning with very limited questioning opportunities afforded to students. Teachers in this stage almost universally view the IWB as a replacement for a black/white board, and use it in a familiar, whole class teaching approach (British Educational Communications and Technology Agency (BECTA), 2007), essentially doing old things in new ways (Prensky, 2005). This is a natural step, as virtually all teachers have used either a black or whiteboard extensively as a teaching tool.

Two examples of the whiteboard replacement phase are using specialist IWB software to "write up class agendas on blank pages using interactive whiteboard software (without saving), and using the projector to display weekly spelling lists typed legibly using a Word processing program" (Sweeney, 2008, p. 26). Teachers in this stage consider the main benefits of IWBs to be better lesson presentation, time saved in clearing the board between lessons, lesson pace, and software that enables text recognition. It is not likely that teachers will prepare lessons integrating IWBs in advance at this stage, nor are they likely to share resources with their peers (Betcher & Lee, 2009). Nevertheless, there are still numerous benefits to student learning, as students exhibit higher motivational levels, they appear more engaged, and they perceive lessons as more interesting as they contain greater variety (BECTA, 2007).

In this substitution stage, it is important for teachers to become competent at using the basic operating software on their IWB, as well as becoming comfortable using a stylus or finger to replace a mouse (Goodwin, 2011; Sweeney, 2008). Such familiarity is vital to support a pedagogical change and avoid the "inherent danger that the IWB becomes an information presentation platform, rather than another resource for developing questioning and interactive learning" (Beauchamp, 2004, p. 333). To progress from beginner status, Beauchamp (2004) contends that a pedagogical shift in teaching style is required, which is most readily achieved by teachers who willingly choose to invest their time, energy and effort into enhancing both their teaching style and technological skills.

Accommodation

As teachers begin to include more opportunity for student questioning into their teaching style, they move towards the ‘accommodation’ phase of Goodwin’s (2011) continuum. This phase is still primarily based on didactic lecture-style teaching, but also incorporates the use of pre-made resources for display purposes. Also, teachers start to plan with and use features of the IWB software as a “visual support and organisational tool” (Sweeney, 2008, p. 27). The skills developed in the substitution stage are applied more readily, and some of the basic interactive software tools such as highlighting or drag and drop, are incorporated into lessons (Goodwin, 2011; Sweeney, 2008). Teachers may also integrate simple interactive websites, multimedia resources, clip art or other graphics for decoration, or external software programs, such as Microsoft PowerPoint, into lessons (Beauchamp, 2004; Goodwin, 2011). However, the teacher is generally still the dominant user of the IWB at this stage, and the students are exposed to the same lesson at the same time and pace, which is set by the teacher (Sweeney, 2008). Although teachers are often apprehensive about the time requirements of planning more extensive use of the IWB, and also about how to use the technology in meaningful ways, experimentation with the IWB gradually eases this concern as they develop confidence and start to include opportunities for students to interact with the IWB (Sweeney, 2008; Beauchamp, 2004).

The development of file management skills and confidence in locating and using online resources are two other characteristics of this stage (Beauchamp, 2004). Both students and teachers use and understand terminologies consistent with an IWB related vocabulary (Beauchamp, 2004). Significantly, not only does the teacher’s technical ability improve, but also their teaching becomes more dynamic as it changes to that of a facilitator; their interactions with students evolve noticeably to provide learners with greater responsibility for their learning (Harris, 2002).

Exploration

For teachers, the ‘exploration’ stage of Goodwin’s (2011) continuum is signified by a comfortable familiarity when using the IWB. Up to this point, the challenge of mastering the IWB most likely hid its immense benefits, but now the IWB has become a routine teaching tool that they have come to rely upon (Sweeney, 2008; Beauchamp, 2004). Teachers’ technical competence is further developed as they begin to exploit more of the interactive IWB software tools, such as the spotlight, or rub and reveal, to support their lessons. Teachers learn to adapt IWB software resources and lessons made by others, and include more extensive use of hyperlinks to a variety of multimedia and online resources (Goodwin, 2011). While the way in which the IWB is used is still determined by the teacher, more student-centred learning is evident through a mix of whole and small group use, though the teacher and students use the IWB at separate times. Student work may also be displayed, and ideas shared visually (Goodwin, 2011; Sweeney, 2008).

The exploration stage is critical to the ongoing development of a teacher's changing pedagogical practice, for it is at this time a genuine commitment to becoming an expert at using an IWB is either forged or halted (Sweeney, 2008). To this point, any pedagogical change may have been predominantly subconscious; however, there is little doubt that a conscious "mind shift from a behavioural to a cognitive view of learning supports this 'breakthrough'" (Sweeney, 2008, p. 25). This type of pedagogic change relies upon genuine understanding of the importance of interactivity between teachers, students, and IWBs as a tool for learning (McCormick & Scrimshaw, 2001). Support through this stage is critically important. The transition to the next stage is much easier for teachers who are competent computer users, who have unlimited access to an IWB, and who can access the software on laptops they can utilise from home at their leisure (Sweeney, 2008).

Interaction

'Interaction' is the next IWB user competency level, as defined by Goodwin (2011). Using an IWB at this stage is a student-centred, collaborative endeavour between students and teacher, and it may be used by individuals or by mixed groups of varying sizes. It is signified by advanced software integration, purposeful overlaying of various objects, and capitalising on an assortment of interactive techniques, embedded objects, multimedia, and peripheral devices such as digital and video cameras and voice recorders (Goodwin, 2011; Sweeney, 2008). Not only is students' work shared through the IWB, but the IWB is used as a conduit to annotate and record editing comments. Furthermore, discussion surrounds concepts demonstrated on the IWB as ideas are explored extensively through various digital representations (Goodwin, 2011). A high level of technical competence and understanding of how IWBs can support students' learning through responsive interactive experiences and sustained questioning is displayed by teachers in this phase. Learning experiences are authentic, use real time information, and are differentiated to meet different students' learning needs to increase student involvement and engage interest (Sweeney, 2008).

Advancement

The highest level on Goodwin's (2011) continuum is that of 'advancement'. The skills that have been gradually developed at earlier levels are further enhanced to the stage where a teacher consistently demonstrates an outstanding "repertoire of technical skills...seamlessly integrat(ing) a range of software applications, proprietary software and Web 2.0 technologies (such as blogs, wikis and podcasts)" (p. 3). The technology is used to support spontaneous learning opportunities, with student work and learning sequences digitally recorded using IWB software for retrieval, reflection, and continuation at later stages (Goodwin, 2011). Hyperlinks may be used to revisit or revise prior lessons, or to link to student work samples,

annotated items, or other useful artefacts (Beauchamp, 2004; Hennessey, 2011). “As such, the available resources are continuously evolving, providing a visible record of students’ learning journey” (Hennessey, 2011, p. 463). Peripheral items, such as slates, digital microscopes, scanners or voting hardware, are regularly incorporated into lessons (Beauchamp, 2004).

In the advancement stage, a completely student-centred teaching pedagogy becomes the norm, with the interactive potential of IWBs purposely used to develop students’ higher-order thinking skills (Goodwin, 2011). In addition, the teacher’s pedagogy reflects outstanding understanding of how their students learn. They can verbalise how IWBs can enhance learning, and “show ingenuity in developing materials to meet specific learning needs with much more evident differentiation of tasks” (Miller, Glover & Averis, 2004, p. 7).

Hennessey (2011) views the IWB as a tool for initiating and sustaining classroom dialogue, stating that, “This powerful and increasingly prevalent technology opens up opportunities for learners to generate, modify, and evaluate new ideas, through multimodal interaction along with talk...dialogue that highlight(s) differences between perspectives, and make(s) ideas and reasoning processes more explicit” (p. 463). In this final phase, students have the power to direct how the IWB is used, meaningful connections are made between curriculum areas, and learning experiences are based on authentic, real world contexts (Sweeney, 2008). IWBs provide collaborative opportunities for students to “express, explain, justify, evaluate, and reformulate ideas – both orally and using other rich symbolic representations” (Hennessey, 2011, p. 476). As a result, a teacher in this phase of the continuum can make learning experiences truly vivid (Warren, 2003), through dynamic content that adapts easily to the learner’s needs (Campbell & Kent, 2010).

INSTRUMENTAL GENESIS

Goodwin’s (2011) framework highlighted the need for teachers to develop both the technological capacity and the interactive teaching pedagogy required for using IWBs effectively. The process of transforming an artefact or object into an instrument whereby the user develops understanding of the limitations, resources and applications of the artefact, is described by Guin and Trouche (1998) as instrumental genesis. This adaptive process has been explained as the building of utilisation schemes, or “‘stable mental organisation’ including both technical skills and supporting concepts” (Drijvers & Gravemeijer, 2005, as cited in Bretscher, 2009, p. 1341). Thus, when a teacher is given an IWB to use, it is initially a tool; however, it becomes a teaching instrument once their teaching pedagogy has evolved and the technological skills have been mastered. The speed with which this complex transformation takes place varies between individuals, but is worth pursuing, for at this point, the user is able to reflect on, and further evolve, its use (Guin & Trouche, 1998).

FACTORS INFLUENCING TEACHERS' PROGRESSION IN IWB USE

Goodwin's (2011) continuum provides a framework for guiding teachers in how to harness the potential of IWBs as a teaching tool that will engage students cognitively and maximise learning. It describes the ways in which an IWB may be used, with regard to both the technological competence required to support a teacher's growing confidence and skill, and the pedagogical transformation required to capitalise on the opportunities presented by this technology. It should be noted that teachers may exhibit overlapping characteristics from different stages of the continuum, as their skills are developing. However, Sweeney (2008) warns that the longer teachers spend in the first three stages, "the more entrenched the interactive whiteboard will become into their existing traditional practice" (p. 26). Likewise, Glover and Miller (2001) suggest that without progression in technical and pedagogical skills, it is possible that "the technology will lose its novelty value and teachers will revert to conventional methodology" (p. 257).

There are many interacting variables that influence the degree to which a teacher may choose to integrate the technology into their teaching practice. For example, an overwhelming fear of being unable to cope with technology in a classroom setting can cause anxiety and a strong reluctance in learning to use tools such as IWBs. John and Baggott La Velle (2004) used the term 'retreatism' to describe the stage of technology use in which teachers display technophobic-type dispositions. They also used it to categorise teachers who perceived technical incursions into the classroom as threatening to their pedagogical beliefs and derogatory to their teaching. Evidence of retreatism has been found in a recent Australian study by Serow and Callingham (2011), in which they noted it to be a "difficult and time-consuming hurdle to overcome" (p. 170).

THEORETICAL FRAMEWORKS

Since the 1970s, when it was realised that technology was not utilised in educational contexts to the extent that had been anticipated, there have been many attempts to understand causal factors (Compeau & Higgins, 1995). The application of Fishbein and Ajzen's (1975) theory of reasoned action to this context, suggests that teachers would be more prepared to use technology if they understood the related benefits. Bandura's (1986) social cognitive theory identified self-efficacy as being influential on an individual's behaviour. In this context, it refers to an individual's beliefs about their ability to use technology (Rosenfeld & Martinez-Pons, 2005). Building upon the earlier theory of reasoned action, Ajzen (1991) developed the theory of planned behaviour, in which perceived behavioural control was considered to be an influential factor on behaviour. In this context, it refers to the level of ease or difficulty a person perceives the technological feat to be.

One of the most widely used theoretical frameworks for examining behavioural models related to technology-use was created by Fred Davis in 1985 (McCoy, Galletta, & King, 2007; Chuttur, 2009). In developing his Technology Acceptance

Model (TAM), Davis drew upon Fishbein and Ajzen's (1975) theory of reasoned action response, particularly focusing on how the variables of perceived usefulness, and perceived ease of use, related to user acceptance levels of technology. Legris, Ingham, and Collette (2003) have acknowledged the value of the TAM framework; however, they suggested it was limited in breadth, missing variables related to "both human and social change processes, and to the adoption of the innovation model" (p. 191). Likewise, Dishaw and Strong (1999) suggested that the TAM framework would have greater external validity if it also probed various types of influential factors and the context in which the technology was being applied.

Recent research by Teo (2009) also suggested that the application of Davis' TAM "in education is limited" (p. 302), due to teachers today having greater independence and choice in how the technology is applied. Teo (2009) concurred with other research that identified attitudes towards computer use, technical complexity, and facilitating conditions, such as professional learning and school culture as important variables in determining technology acceptance (Compeau & Higgins, 1995; Thompson, Higgins, & Howell, 1991). Thus, having examined the key points in the aforementioned theoretical developments in understanding an individual's technology acceptance, Teo's (2009) methodology focuses predominantly on perceptions about the perceived usefulness and perceived ease of use of technology, technological self-efficacy, and beliefs about how complex technology is, attitude towards computer use, and the facilitating conditions supporting or negating technology use.

IWBs IN PRE-SERVICE TEACHER EDUCATION

Few would argue that teacher training courses should not provide pre-service teachers with "the tools and experiences that will be useful for the regular activities in their future jobs" (Teo, 2008, p. 414). There are pockets of unexpected success stories about university faculties embracing IWBs (Friel, Britten, Compton, Peak, Schoch, & Kent VanTyle, 2009), but it is more common to find research claiming that university programs are usually unsuccessful in providing opportunities for future teachers to learn how to use technology effectively in a classroom (Baylor & Ritchie, 2002). There is a growing expectation that new teachers will be "well versed in providing an efficient, seamless integration of IWB technology into lessons across the curriculum" (Campbell & Kent, 2010, p. 451). Universities need to provide pre-service teachers with opportunities to develop their IWB skills but it must be recognised that the pace of change is slow (Campbell & Kent, 2010). There is evidence that this may be due to "fear of failure, disinterest, or aversion to change" (Friel et al., 2009, p. 300). Regardless of these barriers, maximising the potential of this technology is a goal worth striving for. In Teo's words, "To do otherwise is to produce future teachers with underdeveloped skills in the use of technology" (2008, p. 414).

With the extensive exposure to technology that most pre-service teachers have experienced throughout their lives, it would seem reasonable to expect them "to be technologically proficient" (McCoy, 2010, p. 1614). However, as Mayo Kajs and

Tanguma (2005) discovered, pre-service teachers' familiarity with every day technology is simply not enough, as "they need specific preparation to develop technology-integrated curricular lessons" (p. 3). Other research has found that the varying levels of mentoring, training and support the student teachers received in using IWBs, when combined with their technological self-efficacy and beliefs about the impact of technology on learning outcomes, linked strongly with their level of use while in the classroom environment on practical experiences (Hammon, Reynolds, & Ingram, 2011).

Hammon et al. (2011) found that using an IWB was a feature of most pre-service teachers' practical school experiences. The student teachers integrated IWBs to varying degrees, from routine use as a whole class teaching tool, to extended use, where students interacted with the IWB, and to innovative use, whereby the technology was integrated in a range of more complex contexts. Other research expressed concern that when students returned from practical school experiences, they reported seeing IWBs used in a very basic manner. As this may instigate a cycle of poor use, it is vital that pre-service teachers become conversant with IWBs, and that they also understand how IWBs can influence their teaching pedagogy (Campbell & Kent, 2010). The development of these understandings and technological skills needs to be addressed, for the most effective "use of new technologies is to provide just in time support...assistance and encouragement when needed. Not tomorrow. Not next week. Now!" McKenzie, 1999, p. 89).

IWBs may be a catalyst for educational change, but the real challenge for teachers is to develop understanding of the teaching pedagogy and associated issues required to capitalise on the potential of this technology (Betcher & Lee, 2009). A UK report by the Joint Information Systems Committee (2009) succinctly states, "Rather than replacing the teacher, technology has in many ways increased the focus on pedagogic skills. The art of the practitioner as instigator, designer and animateur remains key to the process of learning" (p. 5). Whilst it is important for universities and pre-service teachers to embrace IWB technology, the process is not a simple one (Campbell & Kent, 2010). Studies such as this raise awareness of the potential of this technology amongst pre-service teachers, university teaching staff, and in-service teachers. Campbell and Kent (2010) suggest that teacher education programs may benefit from developing a two-way learning relationship with in-service teachers. However, more research is needed to investigate successful models of IWB integration at universities, at both staff and pre-service teacher levels. While it is impossible to predict the evolution of this technology, there is no doubt that the rapid development will continue, as should the teacher education programs.

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SECTION 4

**RESEARCHING THE TEACHING AND LEARNING OF
MATHEMATICS**

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INVESTIGATING THE TEACHING AND LEARNING OF MATHEMATICS

A reader from outside mathematics education research may be surprised at the diversity within the chapters in this section. There is a long tradition of educational research into the teaching and learning of mathematics, beginning with cognitive issues associated with mathematical content and its impact on the learning of different topics, and moving towards a consideration of broader issues in an effort to understand better the myriad factors that influence what takes place in mathematics learning environments.

In the introduction to the quadrennial review publication of the Mathematics Education Research Group of Australasia, Perry, Lowrie, Logan, MacDonald, and Greenlees (2012, p. 3) write about the importance of context in mathematics learning and teaching, an observation that is certainly true of other areas of education as well. A simplistic view of ‘context’ might point to external, environmental factors that exert influence on what takes place, but in the complex milieu of education ‘context’ is multifaceted and multidimensional. Students themselves bring their own capacities and past experiences to learning, and, additionally, bring attitudes towards and beliefs about what and how they learn. The curriculum, together with the way it is implemented by teachers, impacts on the activities that students encounter. Finally, the very nature of the content itself contributes to students’ learning success, with some concepts known to be easy to learn and others harder.

Research into teaching and learning necessarily concerns itself with context; indeed, it cannot divorce itself from it. The learner is not a seed, planted under laboratory conditions with every variable controlled or measurable. The teacher—if there really was a laboratory—is sometimes a variable, sometimes a seed, but never fully or controllably any of these things. Moreover, the teacher is often a researcher. This may begin as simple informal practice as part of the regular work of teaching, but in many cases the questions that arise in the teaching and learning environment demand further and formal investigation. Thus much of educational research is conducted by people who have been or currently are practising teachers, and their focus is on learners, the learning environment, and the factors that influence learning.

Kilpatrick, in a survey of the history of research in mathematics education written in 1992, highlights several purposes for research, depending on one’s view of research. He cites Carr and Kemmis (1986) in proposing that in the empirical-analytic tradition, the aims of research are like those of traditional scientific disciplines, with

a focus on explaining, predicting, and controlling. Kilpatrick further suggests that if, alternatively, research is viewed as bringing an interpretative lens to the culture being examined, then research tries to find the meanings for the activity held by those engaged in it. Finally, those approaching research from the point of view of critical sociology often have, as their purpose, a desire to give teachers and learners greater autonomy and involvement in improving practice (Carr & Kemmis, as cited in Kilpatrick).

More recently, there has been further consideration of the nature of educational research, and the place of theory and the importance of meaningful impact. Silver and Herbst (2007, p. 44) describe a scholarship triangle for mathematics education, in which the vertices of research, practice, and problems are linked with bidirectional arrows that reflect the interplay of these components. They argue, however, for the place of theory as a mediator, placing it at the centre of the triangle (Figure 2.2, p. 46). They highlight how theories have informed and been informed by research and practice, and help us to understand and explain problems that arise in mathematics education. William and Lester (2008) argue persuasively for a deeper consideration of the relationship between research and educational practice, “promoting a renewal of a sense of purpose for our research activity ... namely, a concern for making real, positive, lasting changes in what goes on in classrooms” (p. 38).

The chapters in this section illustrate some of these issues very clearly. They focus on different stages and aspects of learning, and, to some extent, allow us to examine the role of content and context in this endeavour. They also depict various stages of the research process, as well as giving us indications about possible purposes for this research.

The chapter by Chaman, Beswick, and Callingham highlights the complexity of the context impacting on student performance. They undertake a broad review of the factors that influence mathematics achievement for secondary school students, and postulate a model that captures the relationships among the variables. With the growth in international testing programs such as the Trends in Mathematics and Science Study (e.g., Thomson & Buckley, 2007) and the Programme for International Student Assessment (e.g., Thomson, de Bortoli, Nicholas, Hillman, & Buckley, 2011) there has been increased concern about student performance, and a growing desire to understand how affective and social factors impact on outcomes. Leder and Forgasz (2006) discuss the history of research into the affective domain, and chart the approaches and results that have led to a deeper—but still incomplete—understanding of attitudes, beliefs, emotions, and values in mathematics education. Lomas, Grootenboer, and Attard (2012) also highlight the complexity of this domain and discuss the difficulty of researching within it because of challenges in establishing sound and valid methodological approaches.

Chaman and her colleagues chart their way through some of these issues, focussing first on mathematics anxiety. This has been identified as becoming particularly significant for students during the secondary years of schooling, and a negative correlation between anxiety and achievement has long been established. Despite over

two decades of work in the area, however, there remain questions about causality and the mechanisms by which anxiety develops. Chaman et al. then consider attitude towards mathematics, and point out that this is a multifaceted construct. While attitude—as a broad construct—is known to impact on performance outcomes, the interplay of students’ beliefs about the importance and utility of mathematics, and their levels of enjoyment and confidence, is complex and difficult to disentangle, and, moreover, impacts on anxiety as well.

Three final factors are considered by Chaman et al. Socioeconomic status is known to be one of the significant predictors of success in education generally and mathematics in particular (see, e.g., Rothman, 2003), but it, too, is multifaceted and complex. Chaman et al. instead focus more specifically on parental involvement—a factor known to correlate with socioeconomic status although with only small effect sizes (Sui-Chu & Willms, 1996)—and consider the relationships between parental expectations and parenting style, and academic achievement. Finally, the influences of gender and culture are addressed, and the known links between these factors and anxiety, attitude, and parental involvement are explored. The authors conclude by positing a model that relates their five identified factors to mathematical achievement and proposing the use of international comparisons at the senior secondary level to illuminate the strength and nature of the relationships. Their intended study of this complex area of mathematics education should help us to better understand the strength and direction of cause and effect influences as these factors interact. This, in turn, should provide an enhanced picture of the social and affective context in which students learn mathematics.

Whereas Chaman and her colleagues were considering older school students, Chesney and Callingham turn their attention to a Grade 2 class and provide a snapshot of the diversity of enacted strategies and understanding amongst children evident even after only three years of schooling. At this age students have moved beyond counting and are starting to operate with numbers, invent their own tools for computation, and build on taught approaches. At this age much work is done on developing facility with basic number facts and devising associated strategies for mental computation. The area of mental computation has received considerable attention over the years, notably, for example, in the research work of Reys (1984) and then in the seminal teacher support materials of McIntosh and Dole (2005). The number properties upon which mental computation relies are also a fundamental focus of early years numeracy programs, both in Australia and overseas. Chesney and Callingham’s work presents two case studies, in this case two 7-year-old children who were invited to respond to a series of questions that allowed them to reveal their computation strategies.

Chesney and Callingham’s choice to use interviews allows them to present a clear picture of the stages of understanding through which these students are progressing. Two striking aspects of their data will be familiar to teachers, regardless of the ages of the students with which they work. The first of these is the extent to which the students’ facility with the tasks varies. One student has, for the most part, a range

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of strategies that can be applied fluently and flexibly to elementary arithmetic problems. The second student, despite being in the same grade, appears to be at a far earlier stage of development, with a limited repertoire of techniques that are not always securely held or consistently applied. This kind of diversity is echoed in classrooms throughout the world, and provides further evidence of the challenges faced by teachers in meeting learning needs. Lampert (2001), in her landmark book on the problems of teaching, writes about the challenges of dealing with a classroom full of diverse learners, and allowing them to build up basic skills but also engage in the activity of “doing” mathematics. Here in Chesney and Callingham’s work there is a focus on developing a set of known strategies, but doing so requires recognition of each student’s current levels of understanding and knowing what is the next appropriate stage of progression. The second notable feature is the existence of seemingly contradictory understanding that is evident in one of the student’s responses. The child can recite the multiples of 10 but has not yet connected this to addition of such multiples. This appears to be the result of the parallel development of two as-yet-unconnected concepts, another well-known phenomenon in education.

Chesney and Callingham’s work fits with Kilpatrick’s third aim for research. Although the research appears to have its focus on the stages of learning through which children pass, there is a clear sense that an understanding of these allows teachers to provide learning experiences that will best meet the needs of such students. It also highlights several contextual complexities. First, there are the diverse and extensive conceptual connections within the topic of number itself. As a simple example, full understanding of the multiples of 10 issues in the previous paragraph requires the learner to understand (i) connections between counting numbers and the multiples of 10 (e.g., identifying the alignment of 1, 2, 3, ... with 10, 20, 30, ...), (ii) that addition of multiples results in another multiple, and (iii) that in the case of multiples of 10, moreover, this reflects addition of the counting numbers (so that, for example, the result of $20+30$ can be ascertained by considering $2+3$ and taking the resultant multiple of 10). Second, there are the challenges of providing learning experiences that allow these connections to be developed. This involves materials with high epistemic fidelity (Stacey, Helme, Archer, & Condon, 2001) so that they correctly represent mathematical ideas, but which also have high transparency, to make those ideas evident to the student. Third, the first two points must be attended to in a classroom where the student diversity—the extent of which can be only partly illustrated by Chesney and Callingham’s two cases—is manifest not only in the students’ varying levels of mathematical understanding but in their wide-ranging emotional, social, and broader educational needs.

In the third chapter in this section, Reaburn turns her attention—and ours—to older students and a different domain: statistics, or, more specifically, probability. The students in her research had completed school education and were embarking on tertiary study, and thus reflect a well-educated adult population. Her findings, therefore, may be regarded as indicating the likely outcomes from schooling for such a group. In contrast to the case study approach of Chesney and Callingham, Reaburn

utilises a questionnaire approach to seek quantitative data from her sample of 75 students, covering a wide range of statistical topics, from which she here focuses on understanding of variation.

The concept of variation is fundamental to statistical understanding. A complete understanding of random events such as rolling a die requires, at its heart, an appreciation of (i) the long-term stability of the phenomenon, captured in the idea that, for example, a 3 will occur $1/6$ of the time in the long-run (which makes “random” predictable in some sense), and (ii) variation, reflecting the way that in the short term not only is it impossible to predict the result of the next die roll but that the distribution of the outcomes of the next several rolls can be quite diverse (which makes “random” unpredictable in some sense). What’s more, these two attributes mean that in any long sequence of rolls the proportion of 3s, for example, will not necessarily be exactly $1/6$ but close to it, with the closeness depending on the length of the sequence. Acquiring this complex understanding is known to be difficult (see, for example, Greer’s 2001 review, and, more locally, the work of Watson and her colleagues as illustrated in Watson, Kelly, Callingham, and Shaughnessy, 2003). What is equally interesting, however, is how the very complexity of these concepts itself interferes with research into them, making such research particularly challenging. Greer reports on results from several studies and highlights the difficulty of designing tasks and questions to probe understanding, noting that “Given the instability of students’ responses when apparently minor changes are made in questions or embodiments, the experimenter has to bear in mind that, as well as the subjects constituting a sample, so do the experimental tasks” (p. 23). In the case of variation, framing questions that allow students to reveal what they understand it to be, and its extent, is particularly problematic even at a simple level, since what is “possible” in a random situation and what is “likely” may be two very different things.

Reburn tackles this by building on existing research approaches and questions. The students in her study were asked to consider the behaviour of a simple random mechanism—in this case a spinner—and, through a structured sequence of questions, were given the opportunity to indicate how much variation in the outcomes they might expect. Not only did this reveal that some students expect very little variation, believing the long-term probability to be absolute and always mirrored in any experimental probability obtained for a sample, but also revealed that another sizeable group expected far more variation than is realistic. For her most subtle example, which required extremely good judgement about the extent of variation from the long-run probability, only 11% of students were able to make such an assessment. Kahneman and Tversky, in 1982, brought to public awareness the extent of the difficulty that people have in making probability-based judgements; Reburn’s work shows us in more detail the scope of some aspects of this problem. Although her study has analytic overtones, she acknowledges that the outcomes of the study should increase teacher awareness of the need to help students build greater intuition. She concludes, however, with a warning about how changes in

students' educational contexts, from the practical and experiential, to the formal and abstract as they progress through schooling, may impact on their understanding of these challenging ideas.

The sequence of chapters concludes with a report that reflects the ongoing, cyclical, and refining nature of educational research. Arising out of Fitzallen's now completed doctoral thesis, this chapter illustrates the ways in which research into learning informs teaching, which in turn becomes a focus for further research. To a greater or lesser extent, each of the three possible aims of research identified by Kilpatrick (1992)—to analyse, to interpret meaning, and to involve people in improving their own practice whether as teachers or learners or both—is reflected here.

At the level of specifics, Fitzallen and Watson's work is in a similar domain to Reaburn's, focusing on variation and covariation as important concepts underpinning broader statistical understanding. Fitzallen and Watson are interested in graph creation and interpretation, because graphical representation is central to identifying and demonstrating the relationships among variables, which Konold and Pollatsek describe metaphorically as "the search for signals in noisy processes" (2002, p. 259). The advent of computer graphing packages such as *TinkerPlots: Dynamic Data Exploration* (Konold & Miller, 2005) affords opportunities to explore data in rapid and meaningful ways, and provides the possibility of building student understanding if it can be utilised in pedagogically productive ways. With this scenario in mind, Fitzallen and Watson report on the design principles that underpinned the development of a learning sequence for building understanding of graphs and, ultimately, covariation.

As a theoretical basis for the design, they use the renowned Dutch approach to mathematics learning known as *Realistic Mathematics Education* (van den Heuvel-Panhuizen, 2000), which focuses on building up abstraction and on using context as a central facet of instructional design. In addition to this general overarching framework, Fitzallen and Watson's own content context—statistics—requires attention to its own frameworks. Together they developed a hierarchy for graph creation and interpretation (Watson & Fitzallen, 2010), which they utilised in designing a learning sequence using *TinkerPlots*. This sequence uses real data and the affordances (Gibson, 1977) of *TinkerPlots* to build understanding of covariation through progressively more complex levels of graph creation and interpretation.

Having considered the specifics, at a broader level Fitzallen and Watson's work highlights the importance of basing both the work of teaching and the work of research on soundly understood theoretical principles. In addition, it demonstrates the contribution that the results of research can make to provide such a foundation. The circle is completed in the aftermath of the design work reported in Fitzallen and Watson's chapter, but not reported in this book: Fitzallen's doctoral thesis investigated the outcomes of students' learning achieved by following the designed sequence of teaching. In a very real way, this work epitomises the scholarship triangle of Silver and Herbst (2007), with research, practice, and problems being mediated by theory.

As suggested in the opening paragraph, those outside mathematics education research may find the diversity within this collection of chapters surprising. The field of mathematics education research is probably as old as the field of educational research itself. Despite this, it is evident that the variety of contexts that impact on the learning and teaching endeavour in mathematics—including social, affective, cognitive, content, curriculum, classroom, teacher, and technology aspects—are still only partially understood. The development of theory is an ongoing task and the contribution that research makes towards identifying influential factors and extending our understanding of this context is essential. The studies described here—whether in the early stages of theory development or concluded with analysed results, whether case study or larger scale, whether of older students or of younger, whether in one domain of mathematics or another—are building on extant research to enrich our understanding of the enterprise of mathematics education. Mason and Johnston-Wilder (2004) wrote the following of mathematical understanding, but it seems to apply to what we hope to learn from the process and outcomes of conducting research:

Understanding is difficult to capture in words, but has to do with the sensitisation and enriching of awareness, including connections and images, access to language, and extension of powers to make sense of phenomena; and training of behaviour in significant procedures and techniques.... Attention is structured, and learning can be seen in terms of shifts in the way we attend to phenomena, indeed the way we select and identify the phenomena to which we attend. (p. 310)

The research agendas being pursued here allow us to give attention to significant educational phenomena.

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FACTORS INFLUENCING MATHEMATICS ACHIEVEMENT AMONG SECONDARY SCHOOL STUDENTS: A REVIEW

Secondary schooling is an important stage of education during which students acquire skills needed for future education and employment. Gaining mathematical knowledge and competence is an integral part of this process. Studies have stressed the importance of achieving necessary mathematical skills, and of success in secondary school mathematics. In particular, mathematics achievement at secondary school has been linked with success in tertiary education, particularly tertiary level mathematics performance (Wilson & MacGillivray, 2007). Mathematical achievement or mathematical literacy is also important at the national level as evidenced by the intense interest of governments of participating countries in international measures of these constructs, primarily the Trends in Mathematics and Science Study (Thomson & Buckley, 2009) and the Programme for International Student Assessment (Thomson, de Bortoli, Nicholas, Hillman, & Buckley, 2011). Despite evidence of the benefits of mathematical education, the level of participation in the most demanding mathematics subjects in Years 11 and 12 and beyond is declining in Australia as well as in many other countries (Osborne & Collins, 2001; Fullarton, Walker, Ainley, & Hillman, 2003).

Achievement in mathematics among secondary school students is influenced by a range of factors including mathematics self-concept (Wang, 2007); mathematics anxiety (Ashcraft, 2002; Ma & Xu, 2004; Hembree, 1990); attitude towards mathematics (Hannula, 2002); mathematics self-efficacy (Pietsch, Walker, & Chapman, 2003; Williams & Williams, 2010); parental involvement (Jeynes, 2007); teachers (Hill & Rowe, 1998); peers (Berndt & Keefe, 1995); and gender (Kenney-Benson, Pomerantz, Ryan, & Patrick, 2006). In this review we focus on anxiety and attitude as related variables, and their interaction with parental involvement to influence mathematics achievement. We consider the impacts of each of mathematics anxiety, attitude to mathematics and parental involvement on mathematics achievement, before considering the mediating influences of gender and culture. Finally we present a tentative model of the interactions of all of the variables considered based on the literature review.

METHODOLOGY

The literature reviewed was broad ranging, with a view to establish the current consensus of the research. To this end, peer reviewed articles published in journals in both the educational psychology and mathematics education literature were given greater weight than unpublished or less rigorously reviewed sources (e.g., unpublished theses or conference papers). In addition, we took care to select articles in which the relevant constructs were given broadly consistent definitions and we paid attention to the seminal, and hence much cited works, such as the meta-analysis of Ma and Kishor (1997), and more recent findings that present the current state of research in the field. Studies involving secondary mathematics students were prioritised but those involving other cohorts were considered when relevant – details of participants other than secondary students are provided throughout the review.

MATHEMATICS ANXIETY

Attempts to define mathematics anxiety date back to the seventies and, although understanding of the construct has developed over time, early definitions and their elaborations remain current. Spielberger (1972) defined anxiety as a condition characterised by feelings of tension and apprehension. Richardson and Woolfolk (1980) defined mathematics anxiety as a condition in which students experience negative reactions to mathematical concepts and testing procedures. Richardson and Suinn (1972) added that mathematics anxiety interferes with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations. It includes feelings of helplessness, dread and mental disorganisation at the prospect of engaging with mathematics (Ashcraft & Faust, 1994). Mathematics anxiety is considered to have cognitive, affective and somatic components (Cavanagh & Sparrow, 2011) that are influenced by a range of factors including parents, teachers (Goldstein, 1999; Jennison & Beswick, 2009), peers and teaching (Ma, 1999; Turner, Midgley, Meyer, Gheen, Anderman, & Kang, 2002).

Mathematics anxiety has been identified as an issue at every level of schooling from the early primary years through to tertiary level (Ma & Kishor, 1997) but the secondary school years appear to be the key period in which it develops. Hembree (1990) identified the early years of secondary school as crucial but, more recently, Bekdemir (2010) found that for his pre-service primary teachers mathematics anxiety appeared to have emerged in the senior secondary years, specifically Years 9-11, often as a result of a particularly embarrassing moment in the context of learning mathematics. His subjects were senior elementary pre-service teachers in a university in north-eastern Turkey. In locating the origins of mathematics anxiety in the secondary school years it is worth noting that primary school students may be limited in their capacity to articulate anxiety. In addition, measures of mathematics anxiety typically rely on self-report data in the form of responses to Likert type items, and that most research of the construct has involved adult

students, often pre-service primary teachers who may be more likely to remember experiences at secondary school than earlier ones. These facts may, therefore, result in under estimates of the prevalence of mathematics anxiety among primary school students.

The widely accepted definition of Richardson and Suinn (1972) implies that mathematics anxiety would necessarily interfere with mathematics performance. Research has indeed revealed a negative relationship between the two (see examples, Ma, 1999; Woodard, 2004). Hembree (1990) also found a negative correlation between mathematics performance and mathematics anxiety in his meta-analytic study of mathematics anxiety. Attributing causality in either direction is, however, problematic with researchers adopting each of the three possible views, namely that: mathematics anxiety causes poor mathematics achievement; mathematics anxiety is a result of poor mathematics achievement; and mathematics anxiety and poor achievement develop together. Ma and Xu (2004) observed that few researchers have attempted to examine the direction of causation, an omission that they attributed to methodological difficulties. Using data from Longitudinal Study of American Youth (LSAY), they found that prior low mathematics achievement appeared to cause high mathematics anxiety in subsequent years across the entire junior and senior high school grade levels. In contrast, there was very little evidence of causation in the opposite direction at any grade level. Ma and Xu (2004) acknowledged limitations of their study, principally the fact that mathematics anxiety in the LSAY data was measured by just two items.

The effects of mediating variables have been used to explain how mathematics anxiety might indirectly cause low achievement. For example, Ashcraft and Kirk (2001) demonstrated that high mathematics anxiety is associated with smaller working memory capacity, and consequently poor performance in mathematics when assessed with mathematical as well as non-mathematical tasks. They also found that anxiety about mathematics can make it difficult for students to concentrate on the task at hand and this, in turn, inhibits performance.

Avoidance of mathematics has been found to be a core feature of mathematics anxiety (Friman, Hayes, & Wilson, 1998). Students with high mathematics anxiety are more likely to avoid mathematics related activities, courses, or majors which limit their career choices (Ashcraft & Kirk, 2001). According to Preis and Biggs (2001), there is a cycle of mathematics avoidance which includes four phases:

- a. negative reactions to mathematical situations resulting from past negative mathematical experiences;
- b. avoidance of mathematics situations;
- c. poor preparation for mathematics assessments; and
- d. poor mathematics performance.

They argued that poor mathematics performance can take the person back to the start of the cycle which, if repeated, may result in the individual concluding that he/she cannot succeed in mathematics.

ATTITUDE TOWARDS MATHEMATICS

Attitude towards mathematics is recognised as important to the participation and achievement of students (Papanastasiou, 2002). Ajzen and Fishbein (1980) described attitude as a positive or negative evaluation of a psychological object. Hannula (2002) distinguished four evaluative processes relating to:

- a. emotions experienced whilst engaging in mathematical activities;
- b. emotions elicited by the concept of mathematics;
- c. evaluations of the consequences of doing of mathematics; and,
- d. evaluations of the value of mathematics to one's future goals.

Attitude to mathematics is often presented as multi-dimensional (Ma & Kishor, 1997) characterised by a series of dichotomies: confidence and anxiety (Ernest, 1989), and liking or disliking mathematics; beliefs about whether one is good or bad at mathematics; an inclination to engage in or to avoid mathematics; and beliefs that mathematics is important or unimportant, useful or useless, easy or difficult (Ashcraft, 2002; Ma & Kishor, 1997), and whether it is interesting or uninteresting (McLeod, 1992). These pairings vary in the extent to which they might be considered emotional or cognitive and it seems feasible that an individual might have a negative attitude in terms of some yet be considered to have a positive attitude in terms of others. For example, one could dislike mathematics but nevertheless recognise its importance for one's future. The anxiety-confidence dimension is illustrative of the emotional content of attitude to mathematics that is common to definitions of the construct (McLeod, 1992). It encapsulates the difficulty of disentangling mathematics anxiety and attitude to mathematics and positions anxiety as part of attitude which, in addition to involving negative cognitive and affective evaluations of mathematics, may also entail somatic manifestations (Cavanagh & Sparrow, 2011).

Given the complexity of the construct it is unsurprising that establishing causal connections between attitude to mathematics and achievement in the subject has proven difficult. In reviewing studies that have investigated the connection it is important to be mindful of the definition of attitude to mathematics that was used. Ma and Kishor (1997) in their meta-analysis of 113 studies concluded that a significant but weak causal relationship exists from attitude towards mathematics to achievement. They defined attitude to mathematics in terms of the six dichotomous dimensions attributed to them and considered in their analysis, only studies that used similar definitions. In disaggregating the data they found that the connection may not be important in the primary school years but of practical significance in secondary school. Similarly to mathematics anxiety, mediating variables seem to play a role in the connection between attitude to mathematics and achievement. In particular negative attitudes to mathematics militate against participation in it (Ma & Kishor, 1997). Dogan (2012) suggested that perceptions of one's mathematical competence (a dimension of attitude to mathematics) can influence other aspects of one's attitude to the subject including evaluations of its future importance. These in

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turn may lead to reduced participation in mathematics, once the subject is no longer compulsory.

Subsequent confirmation of Ma and Kishor's (1997) finding of a causal link from attitude to mathematics to achievement comes from a study involving data from 24,599 Grade 8 students taken from the Longitudinal Study of American Youth database (Singh, Granville, & Dika, 2002). Singh et al. (2002) found that a positive attitude to mathematics positively affected achievement in the subject. Attitude to mathematics was measured by three items relating to the extent to which; students looked forward to mathematics classes, saw mathematics as important to their future, and were bored at school. These items capture two of the dichotomous pairs that Ma and Kishor (1997) used to define attitude to mathematics, namely like-dislike and the belief in the importance of mathematics. The third item, namely 'were bored at school', related to interest-disinterest in a non-subject specific way.

PARENTAL INVOLVEMENT

Parental involvement has been among the factors that have been explored in relation to students' academic achievement and linked to successful outcomes. Like attitude, it has been defined in a variety of ways and recognised as multi-dimensional (Chen & Gregory, 2010). Prominent aspects of parental involvement include parental expectations of academic performance (Chen & Gregory, 2010; Jeynes, 2007), parental encouragement of academic success (Chen & Gregory, 2010), participation in school activities such as parent-teacher interviews and active checking of children's homework (Steinberg, Lamborn, Dornbusch, & Darling, 1992), and parenting style (Jeynes, 2007; Steinberg et al., 1992). Chen and Gregory (2010) pointed out that most research on the impacts of parental involvement have focused on the primary school years and hence there is less evidence of its affects with older students. It is also recognised that the different dimensions of parental involvement should be considered separately because their effects on achievement differ and appear to be separate (Chen & Gregory, 2010; Keith & Keith, 1993). The most prominent parental involvement dimensions in the literature are parents' participation in school activities, parental expectations, parents checking homework and parenting style. Consistent with this we consider the impacts on achievement of each of the four prominent aspects of parental involvement in turn. Since most studies have considered academic achievement in general, this discussion is mostly restricted to general academic achievement although the few studies that have considered mathematics have found the general findings to apply to that subject.

Parental expectations indicate the extent of parents' presumptions regarding their child's performance, in the present as well as in the future. In a US study of low attaining Year 9 students, Chen and Gregory (2010) found that parental expectations of academic achievement were associated with greater classroom engagement of students. Jacobs and Harvey (2005) investigated the degree to which parental attitudes towards and expectations of their children's academic achievement predicted

achievement of students in nine schools in Melbourne, Australia. They studied the influence of parental involvement in the whole school context and compared schools rather than individual students. They reported a strong influence of parental expectation on students' achievement. Similarly, in a meta-analysis involving more than 300,000 secondary school students, Jeynes (2007) found a strong relationship between parental expectations and academic achievement, mirroring earlier findings reported by Fan and Chen (2001).

Chen and Gregory (2010) also found that parental encouragement of academic success was associated with more positive student-teacher relationships as perceived by students. In contrast to these findings, parental involvement with homework and being involved in their child's school environment has not consistently been associated with positive influences on students' academic performance (Keith & Keith, 1993; Jeynes, 2007). For example, Keith and Keith (1993) found that time spent on homework was strongly affected by parental involvement defined in terms of parental aspirations for their child's education, parent-child communication, participation in school activities and home structure (including rules about homework). Time spent on homework was in turn related to improved achievement. However, this result has been contradicted by studies that found no relationship between these variables (e.g., Chen & Gregory, 2010).

Considering the impact of parental involvement on mathematics achievement, the findings in general academic achievement seems to apply in mathematics as well. For example, Cao, Bishop and Forgasz (2006) in their study involving students in Years 5, 7 and 9 in Australia and China found that in both countries students' perceptions of parental influence on mathematics achievement declines as the year level increases. The researchers also observed significant differences in the level of perceived parental influence among students in China and Australia, with those in China reporting greater parental influence than the Australian students, with major differences identified in the dimensions of parental expectation and parental encouragement of academic success.

Parenting style describes the overall emotional spirit of the relationship between a child and his/her parents (Darling & Steinberg, 1993). Baumrind (1991) described three parenting styles, authoritative, authoritarian, and permissive, which vary along two dimensions, demandingness and responsiveness. Many studies have reported positive associations between authoritative parenting and academic performance of children and adolescents (see examples, Aunola, Stattin, & Nurmi, 2000; Baumrind, 1991; Ingoldby, Schvaneveldt, Supple, & Bush, 2003; Reitman, Rhode, Hupp, & Altobello, 2002), whereas authoritarian and permissive styles are associated with underachievement (Aunola et al., 2000).

THE INFLUENCE OF GENDER

Gender differences in educational achievement, attitudes and affect have been researched widely because of the under representation of women in courses or

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careers involving advanced mathematics (Else-Quest, Hyde, & Linn, 2010). Gender differences in mathematics favouring boys tend to appear in secondary school (Ma, 2008; Hyde, Fennema, & Lamon, 1990; Mullis, Martin, Fierros, Goldberg, & Stemler, 2000).

Some evidence suggests that gender differences in mathematics performance vary with the complexity of the mathematics. For example, according to Willingham and Cole (1997), girls showed slight advantage in computational skills during primary years, whereas boys showed a small advantage in problem solving and mathematical concepts during upper primary and secondary grades. Some studies have suggested a more pronounced gap in favour of boys among high ability students than among students in general (Gallagher & DeLisi, 1994; Fan, Chen, & Matsumoto, 1997). More recently the gender gap in mathematics appears to have declined (Hyde, Lindberg, Linn, Ellis, & Williams, 2008).

Thomson, Hillman and Wernet (2012) reported evidence from the 2011 TIMSS that Australian Year 8 boys were more likely than their female peers to like mathematics, value it and report confidence in relation to it. They further noted a positive relationship between these aspects of attitude to mathematics and performance on the TIMSS assessment.

In terms of mathematics anxiety there is some evidence of gender differences. For example, Ma and Xu (2004) found that the causal link between prior low mathematics achievement and later high mathematics anxiety across the entire junior and senior high school grade level was greater for boys than girls. However, the relationship between attitude to mathematics and mathematics achievement appears not to be affected by gender (Ma & Kishor, 1997) even though there is evidence that girls are more likely than boys to expect failure and to attribute failure to lack of ability (Aunola et al., 2000). Chen and Gregory (2010) found no differences between boys and girls in the association between students' perceptions of high parental expectations and their actual achievement. There is some evidence of differences in parenting styles according to gender, with parents of girls more likely to report authoritative parenting and parents of boys more likely to report permissiveness. Many other variables including gendered education, general norms reflected in society, parent, and peer attitudes and behaviours are likely to contribute to gender differences in relation to mathematics but these are beyond the scope of this chapter.

CULTURAL DIFFERENCES

Several studies have been carried out to understand cross-national and cross-cultural differences in mathematics achievement, anxiety, attitude, and parental involvement (Else-Quest et al., 2010). The majority of the studies of mathematics anxiety have examined gender differences on a national level (Ho, Senturk, Lam, Zimmer, Hong, & Okamoto, 2000).

Various studies on parenting style and academic achievement based in western cultures have shown that children of authoritative parents have high levels of academic

achievement with higher scores on psychosocial measures than children of authoritarian or permissive parents (Steinberg et al., 1992; Jones, Forehand, & Beach, 2000). However, studies that include different ethnic groups have found marked variations in the relationship between parenting style and academic achievement (Leung, Lau, & Lam, 1998; Garg, Levin, Urajnik, & Kauppi, 2005). For instance, a cross-cultural study to compare the association between parenting style and academic performance among Canadian and East Indian adolescents found a strong relationship between authoritative parenting and academic achievement among the Canadian sample tested but no such relationship was evident for the Indian students (Garg et al., 2005). Furthermore, in the Canadian sample, a higher level of familial interaction was also associated with authoritative parenting. Similarly, authoritative parenting was associated with higher levels of family bonding in the East Indian sample, although no relationship was found between authoritative parenting and academic performance in that context. Leung et al. (1998) found lower rates of authoritarian parenting among Australian parents than those in either Hong Kong or the United States. For the two English speaking groups, academic achievement was positively related to authoritativeness whereas, for the Chinese students academic achievement was positively related to authoritarianism.

A PROPOSED MODEL

The model shown in [Figure 1](#) summarises the ways in which the variables considered in this review appear to interact. There is evidence that mathematics anxiety has a negative relationship with achievement in mathematics of students at all levels of schooling although the direction of any causal link is not clear (Ashcraft & Kirk, 2001; Hembree, 1990; Ma & Xu, 2004). This is indicated by the double headed arrow in [Figure 1](#). A similar connection between attitude to mathematics and mathematics anxiety captures the conceptual interconnectedness of these constructs. A positive association between Attitude to Mathematics and Mathematics Achievement also seems to exist (Ma & Kishor, 1997; Singh et al., 2002). This review has established the significance of Parental Style and Expectations to the academic performance of students (Darling & Steinberg, 1993; Fan & Chen, 2001; Jacobs & Harvey, 2005), although there appear to be variations in these aspects of parental involvement across cultures (Cao et al., 2006; Garg et al., 2005; Leung et al., 1998) and few studies have considered mathematics achievement in particular. There is also evidence that parental style and expectations influence both Attitude to Mathematics (Chen & Gregory, 2010; Jennison & Beswick, 2009) and Mathematics Anxiety (Goldstein, 1999; Jennison & Beswick, 2009). Gender and culture have been shown to have significant but varied effects on at least some of the factors that influence Mathematics Achievement. For example, boys and girls varied in their likelihood of reporting particular parenting styles (Chen & Gregory, 2010). There are also gender differences favouring boys in relation to Mathematics Anxiety (Aunola, 2000; Ma & Kishor, 1997) and Attitude to Mathematics (Thomson et al., 2012), and cultural differences in relation to Attitude to Mathematics (Else-Quest et al., 2010).

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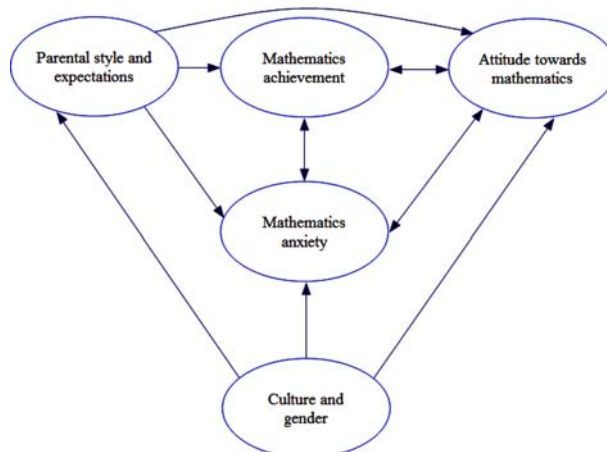


Figure 1. Relationships between selected variables influencing mathematics achievement.

Culture and Gender are, for simplicity, shown together in Figure 1. These factors appear to influence the same set of constructs but, in addition, there are under-explored interactions between these factors (Ho et al., 2000). Also not represented in the figure are the inconclusive findings, in spite of many studies, in relation to the link between gender and mathematics achievement (Fan et al., 1997; Gallagher & deLisi, 1994; Hyde et al., 2008; Ma & Kishor, 1997; Ma & Xu, 2004; Willingham & Cole, 1994). Further research is needed to explore the complex interactions between these variables, especially in the senior secondary grades. International comparisons have the potential to illuminate some of these relationships by establishing which are subject to cultural influences.

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COMPUTATIONAL STRATEGIES USED BY YEAR 2 STUDENTS

This chapter presents two case studies of Year 2 students using a variety of strategies to undertake computational problems. These students had different educational backgrounds and experiences which played out in their diverse demonstrated computational skills. Such differences present a challenge for teachers in developing computational skills in the early years of schooling.

During the early years of formal schooling, from Foundation (the first year of full time schooling) to Year 3 the curriculum has a strong emphasis on developing basic number facts. By Year 2, students are expected to recognise increasing and decreasing number sequences involving 2s, 3s, and 5s and to establish the skills to perform simple addition and subtraction calculations using a range of strategies (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2012). It is not completely clear what constitutes ‘simple’ calculations but the added information in the *Australian Curriculum: Mathematics* indicates strategies such as building to 10, using doubles, 10 facts, and adding 10, sometimes using equipment to support the approach, such as 10 frames and empty number lines.

DEVELOPING COMPUTATIONAL SKILLS

There is a considerable body of research about the development of number concepts and computational skills in young children. One approach to number recognition is subitising, the immediate recognition of the number of objects in a collection. No counting is involved in this process (Clements, 1999; Young-Loveridge, 2002). Klahr and Wallace (1976) claimed that subitising evolves prior to counting, and is necessary in the development of counting in children. It is now explicitly considered in early years classrooms, using tools such as dice and dominoes (Papic & Mulligan, 2007). The establishment of one-to-one correspondence—that a number name relates to one and only one member of a set of objects—is another early concept that is critical for young children to acquire (Wright, Martland, & Stafford, 2006).

Wright (1998) developed a Learning Framework in Number (LFIN) that provided a developmental model of early number concepts. This model has been used to underpin programs such as Count Me In Too (Department of Education and Training, 2009) in Australia and Mathematics Recovery (US Math Recovery Council, 2003), now used in many parts of the world. Of particular interest in this study is the component of the model that addresses Early Arithmetical Strategies.

EARLY ARITHMETICAL STRATEGIES

Based on the work of Steffe (1992), six stages have been identified for the development of early arithmetic, although the initial stage (Stage 0) indicates that counting strategies are yet to emerge clearly. These stages are seen as an invariant sequence; that is, a later stage cannot be mastered until the earlier stages are developed. The stages are shown in Table 1, with exemplars of typical behaviours that characterise each stage.

Table 1. Early Arithmetical Strategies (adapted from Wright, 1998)

<i>Stage</i>	<i>Description</i>	<i>Typical behaviour</i>
0	Emergent Counting	No counting demonstrated. May not know number words.
1	Perceptual Counting	Counts objects seen but not when subsequently concealed
2	Figurative Counting	Can count seen and subsequently concealed objects but inefficiently, starting from 1 each time.
3	Initial Number Sequence	Counts on from last number to solve addition problems; may use “count-down” strategies for some subtraction problems.
4	Intermediate Number Sequence	Uses “count-down-to” strategies for missing subtrahend tasks; chooses more efficient strategy from “count-down” and “count-down-to”
5	Facile Number Sequence	Uses a range of non-count-by-one strategies.

The Perceptual Counting stage has links to subitising. Resnick and Ford initially categorised the strategy for addition in which the student needs to decide which of the two addends is bigger and to start counting-on from that larger number. Time spent counting will be reduced using this skill, as it is more efficient and “indicates a higher level of Mathematical understanding” (Resnick & Ford, 1981, p. 76).

As children progress through the Early Arithmetical Strategies, they also begin to develop Base-Ten understanding (Wright, 1998). Typically children show emerging understanding of 10 as a unit when they are at the Stage 3 level of Early Arithmetical Strategies. Initially this concept is about seeing the components of 10, by being able to respond to questions such as “7 plus 3”. Later, 10 is perceived as a unit but requires a concrete representation, such as fingers (Cobb & Wheatley, 1988), before finally being available to be used in an abstract way for counting and computational purposes. Nunes and Bryant (1996) stated that the use of fingers and other concrete materials to aid calculations is significant before tuition in addition, and continues to be so during children’s early years of schooling. When numbers refer to objects in a situation, they make much more sense to young children, than when they do not refer to anything at all. These stages can provide clues for teachers to target teaching processes so that the child develops efficient and effective computation

strategies. These strategies may take written, mental, or technology-assisted forms, but curriculum emphasis is on mental computation with informal recording in the early years.

As children progress beyond early childhood, counting should decrease as the main strategy used in computation, although some counting will be used to count short distances and to make a jump to nearby numbers (Irons, 2002). As suggested by Callingham (2005), weaker students tend to continue to use counting strategies for addition. Strategies using the number five as a staging post can be encouraged and for some children fingers provide a useful intermediate step. Essential reference points are the numbers 5 and 10 (Wright et al., 2006).

Research into mental computation specifically has indicated that skills develop from small whole number single-digit addition problems, including adding zero and use of some doubles, to addition and subtraction with no regrouping, such as 72 plus 6 and 15 subtract 3, and small single-digit numbers to a two-digit number over the next ten, such as 16 plus 8 and 3 plus 48 (e.g., Callingham & Watson, 2008). At the same time, multiplication of small single-digit numbers begins to develop. Weaker students tend to use additive strategies, such as counting on and skip counting, and may rely also on mental representations of standard algorithms (e.g., Hope & Sherrill, 1987). In the study reported here, this background was used to inform and identify children's development of computation skills in response to the research questions:

- What strategies are demonstrated by Year 2 students undertaking computation tasks?
- How do these change over time?

METHOD

Although number knowledge can be assessed by written tests, individual interviews are helpful to show students' thinking (McIntosh & Dole, 2000). Westwood (2008) recommended that the type of approach to computation also needed to be documented during assessment. He used the term "dynamic assessment" in preference to the term "interview," as the former implies the teacher intervenes in the assessment process through prompts and probes, and discovers all the skills the student has, approaching the edge of their knowledge. In this study, although the initial focus was on mental computation, children's informal and formal written approaches were also considered, and prompts and probes used to elicit deeper understanding, as recommended by Westwood.

This study is reported as two case studies of particular students' approaches to computation. Case studies provide deep understanding about particular situations, and are not intended to be generalisable (Stake, 1995). The two students who were the focus of this study do, however, reflect the diversity of children in Year 2. The case study students attended two different capital city state primary schools and had diverse experiences over the period of the study. Whereas one student

had disrupted schooling over that period, the second not only had continuous schooling but also participated in a targeted intervention program that aimed to develop his computational fluency and strategies. Names have been changed for confidentiality.

Case 1.

Anna was a very bubbly and chatty 7-year-old in a Year 2 class. At the beginning of the year in which the study occurred she migrated to Australia with her parents and younger brother, from an English speaking country. Anna was first interviewed in March and then twice in September, after she returned from a three month visit back to her home country.

Case 2.

John, aged 7 ½, was also in Grade 2. He was born in Europe, but came to Australia when very young with his parents and older brother. John was bilingual, speaking his native language at home and English at school. He was the focus of a more detailed study than Anna, involving pre and post-testing, dynamic assessment (Westwood, 2008) and the teaching of two more sophisticated mental computation strategies: bridging-10 and near-doubles.

APPROACH

The students were interviewed in a one-to-one situation in their own schools. They were asked a series of structured computational questions, and their approaches to solving these questions were observed and recorded using field notes. Where appropriate, work samples were also collected. They were followed up some five months later. During that period Anna made an extended visit to her home country, and did not participate in any schooling for three months. She was interviewed again, using similar questions to the first interview, when she returned to her school in September, and again with some extension questions a few days later.

In contrast, John took part in an extended intervention by Author 1, in which he was taught a number of specific strategies, in addition to his usual schooling. He participated in six one-hour sessions over a period of 5 weeks, each of which focussed on developing computational fluency and increasing John's strategy use. His progress during this time was documented with field notes and work samples.

RESULTS

The strategies used by the two children are presented individually, as appropriate to case studies. The Early Arithmetic Stages (see [Table 1](#)) component of Wright's (1998) LFIN is used as a tool to analyse the students' responses.

Anna

The first question asked of Anna was 16 plus 8. Anna used a counting-all strategy, counting individual units from 1 to 16 and then counting on another 8. She lost track of her fingers and gave an initial incorrect answer of 20. When given the opportunity to write, Anna produced the drawing shown in [Figure 1](#), using tally marks.

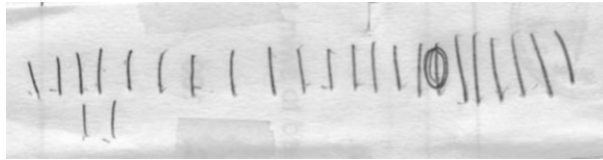


Figure 1. Anna's attempt at 16 plus 8.

Each line represents a unit. The sixteenth line has a circle through it; following are 6 lines, with the last two from the 8 placed under the 16. She then counted these lines, starting at the first one arriving at the correct answer of 24. Anna also used a count-by-one strategy to solve 7 times 3. At first when given this question, she looked puzzled, so the question was rephrased as “You have 3 bags of lollies, and each bag has 7 lollies in it. How many lollies altogether?” Anna was unable to begin to solve this problem unaided, but when provided with a drawing of three ovals representing bags for the lollies, she was able to draw in the lollies and then proceeded to count them all successfully. When drawing the lollies, she started to draw lollies which were “individually wrapped”, but was encouraged to use squiggles instead, so as to save time. [Figure 2](#) shows Anna's drawing used to solve this multiplication problem. In terms of the LFIN, Anna appeared to be at Stage 2, Figurative Counting at the initial interview.

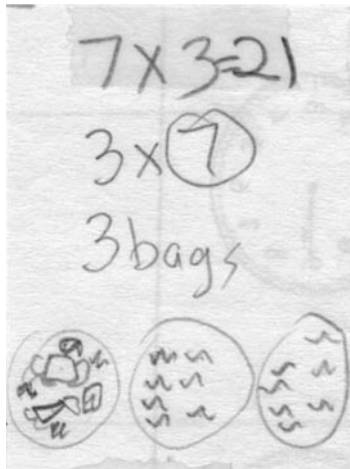


Figure 2. Anna's drawing of 7 x 3.

Five months later, in September some changes in her approach were seen. When asked 16 plus 8 again, Anna started with the 16 and counted-on 8 correctly, using her fingers. She had progressed to a more sophisticated counting-on strategy, placing her in Stage 3, Initial Number Sequence. The limited intervention during the period between April and September suggests that Anna's development was due mainly to maturation, developing more efficient strategies as her general experience broadened.

Some further questions were asked of Anna in September. She demonstrated little understanding of doubles of numbers from 1 to 10 and also of 10 facts, such as 2 plus 8 and 4 plus 6. Anna was reminded that for 5 plus 5 she could look at her fingers, knowing that the answer is always 10. She looked somewhat quizzical, and when asked "How many fingers are there on one hand?" Anna counted them out rather than having this fact immediately available. It may be that in her prior experiences, no-one had explicitly pointed out this everyday number fact, or had suggested that this could be an aid to computation.

A few days later, Anna enthusiastically said that she had been practising. She could recite all doubles from 1 to 10 except 9 and 7 and all the 10 facts except 4 plus 6. She was asked some extension questions such as "20 plus 30?" The response dialogue was:

Anna: *ummmm I think it's 3.*

Researcher: *Are you sure? You can use your fingers if you like.*

Anna: *um... 10?*

These answers were perplexing although Anna was happy with them, so she was asked a simpler question: "OK then, what about 10 plus 6?" For this, Anna answered "Sixteen" automatically without counting on her fingers. She also had swift recall of the answers to 20 plus 5 and 30 plus 6. When asked 20 plus 10, however, Anna started counting on 10 more with her fingers and, after 14 seconds, arrived at the answer of 31. Asking her to repeat 20 plus 10, she rushed, taking only 8 seconds, and arrived at 29. It was apparent that although using her fingers, she was not using one to one correspondence. Anna commented, "I counted a bit too fast, didn't I?" On her third attempt, she was encouraged to slow down and say the number, counting-on from 20 slowly while touching only one finger at a time. She finally arrived at the correct answer of 30, taking 14 seconds to do this.

After this exchange, Anna was asked "Do you know your 10 times tables?" "Yes," Anna replied eagerly and she quickly and confidently recited, "10, 20, 30, 40..." all the way up to 100. Although she could count on by ten, she couldn't apparently apply this skill to solving a real problem. Anna's understanding at the second interview appeared to be around the Figurative Number stage with emerging base ten understanding.

John

The initial pre-intervention interview indicated that John had a well-developed sense of number with a range of strategies available to him. Some examples of John's strategies and thinking were:

- *8 plus 6*: started at 8 and counted-on 6 correctly using fingers.
- *6 plus 7*: started with the larger number, 7, and accurately counted-on 6.
- *7 minus 6* and *14 minus 6*: used the strategy of counting-back correctly.
- *7 times 2*: Counted up in 2s: 2, 4, 6, 8, 10, 12, 14.
- *3 times 6*: $6 + 6 = 12$, then counted-on 6 accurately using fingers.
- *35 times 2*: $30 + 30 = 60$, $5 + 5 = 10$, $60 + 10 = 70$.

When asked $7 + 5$, John initially gave the incorrect answer of 14. When asked to explain his thinking he said "... oops it's 12. I forgot to minus the 2. I did $7 + 7 = 14$, and then minus 2 is 12." This was a clearly articulated description of using a doubling strategy, but obviously it was not John's preferred method, as counting-on was used in the majority of addition problems. He was, however, able to self-diagnose his mistake and correct it, showing a deep understanding of the method he had attempted to use. In the same session, however, John did not attempt the problems $14 - 7$, $12 - 6$ and $18 - 9$. It appeared that although he could use doubles for addition, including some repeated addition that allowed him to solve simple multiplication problems, he was not able to extend this knowledge to subtraction. John's approaches suggested that he was at, or near to, Level 5 of the LFIN, Facile Number Strategies. He used counting-on and counting-back methods, and had a good understanding of some ways to use doubles, but still had some unexpected gaps in understanding.

After the teaching intervention, John was able to solve easily the subtraction problems that he had not attempted, using a double. He commented,

Doubles...it's pretty much easy. The first time I worked one out, I found the double like $14 - 7 = 7$; just need to say 7; $18 - 9 = 9$... 'cos I know all my doubles.

This remark exemplified John's movement away from the inefficient counting back strategy for subtraction to moving on to effective use of doubles number facts. John had linked his knowledge of doubles, $7 + 7 = 14$, to the subtraction equivalent, $14 - 7 = 7$.

John's initial numeracy development meant that with only a little encouragement he was ready to move away from the inefficient strategy of counting-on on to more efficient strategies. As he had a good sense of doubles and used them for $7 + 5$, the strategy of near-doubles was introduced with the aid of a tens-frame and counters. For example, after looking at $4 + 4 = 8$ with the tens-frame John then attempted $5 + 4$ as $4 + 4 = 8$, $8 + 1 = 9$. Later, for the more difficult $9 + 4$, John's initial and rapid response was to use doubles.

John: *Well 9 plus 9 is 18... minus...? Don't know.*

Researcher: *Could you use a friend of 10?*

John: *Yes. 9 plus 1 is 10 plus 3 more is 13.*

With prompting, John recognised that known facts, such as what he called “friends of 10,” could be used but he did not automatically draw on this knowledge.

John did, however, have an extensive repertoire of number knowledge. He correctly answered 5 minus 0 and 3 minus 0, but answered “minus 2” for 0 minus 0. Instead of the researcher ignoring this incorrect answer, John was asked for an explanation. He said, “Well... last year I heard a boy and the teacher talking.... The boy said 5 minus 7 is negative two, and the teacher agreed.” The simple request for an explanation led to a discussion of positive and negative numbers. John understood this concept and answered questions such as 2 minus 7 when phrased as “the temperature is 2 degrees now and drops by 7 degrees overnight. What will the temperature be then?” The exchanges between John and the researcher show the power of such practices.

Several times John gave an incorrect answer, and then only seconds later, self-corrected it. Some of John’s examples of self-correction are shown here.

7 plus 5. 14 oops it's 12. I forgot to minus the 2. I did 7 plus 7 is 14, minus 2 equals 12.

6 plus 9 is 16. [How did you get this?] Well 9 plus 9, is 18, 18 minus 2 equals 16... but 6 plus... is 9... oh it's 3, so 18 minus 3 is 15.

14 subtract 9. After having counted back by ones he said 9. Then he immediately said, Not so sure now cos' 9 plus 9 is 18... so can't be 14. Um... 14 minus 9 equals 5 because I know 9 plus 5 is 14.”

His written attempt to compute 14 minus 9 is shown in [Figure 3](#). It is interesting to note that although John clearly had good understanding of numbers and their inter-relationships, he was still reversing the written numeral 5. During the intervention phase, as John developed and practised the use of more sophisticated strategies for computation, it was observed that his use of fingers for counting-on and counting-back lessened considerably. It was noted however, that when he was tired he reverted to using fingers, even for the simplest problems.

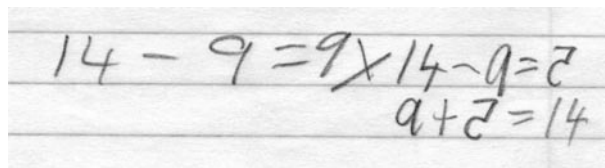


Figure 3. John’s attempt to work out 14 minus 9.

DISCUSSION

The discussion addresses the two research questions separately.

What Strategies Are Demonstrated By Year 2 Students Undertaking Computation Tasks?

Both Anna and John initially used counting-on strategies, although it was evident that John had a greater range of computational methods available to him. Despite using similar approaches to some problems, the ways in which they did so revealed some differences. As John's initial interview showed, he was able to use his fingers accurately for counting-on. In contrast, Anna's procedure for counting-on was problematic; she was not using one number for one finger. In other words, she was not using one to one correspondence, as shown by her answers to 20 plus 10. The use of an inefficient procedure, as in this case, may be observed as a slip or a careless error. Anna was ready to learn about more efficient methods because she recognised that she had "counted a bit too fast."

John also recognised dot patterns in dice, such as drawing on subitising skills. When Anna was asked "How many fingers are there on one hand?" however, she counted them. Common patterns, such as fingers may not have been well developed in Anna's understanding. Although of similar ages, and in the same grade at school, it was clear that John and Anna had very different understandings of number.

How Did These Strategies Change Over Time?

Both students progressed during the six months duration of the study. Initially Anna tackled 16 plus 8 using the naïve strategy, counting-all. A few months later, Anna had advanced to a more efficient counting strategy, as she approached 16 plus 8, by starting at 16 and counting-on 8 more using her fingers. Given that she did progress, with minimum intervention, the finding suggests that she might have made faster progress with a focused and targeted teaching intervention. John used counting-on at the initial interview and was ready to learn more sophisticated strategies. His greater understanding, demonstrated after an intervention program, and his intuitive knowledge of sophisticated ideas such as negative numbers, indicated the value of a stable schooling experience and a targeted program of intervention.

The difference between Anna's and John's understandings of number and place value was broad, both initially and after five months. For 20 plus 30 Anna gave the answers of 3 and then 10, the first answer after a pause of 17 seconds. These answers showed no conceptual understanding that the numbers 3 and 10 were both less than either of the two addends, 20 and 30, and that her answers were impossible. Anna had no awareness of the inappropriateness of her answers. In contrast, John's approach to 35 times 2 revealed a wealth of knowledge; $30 \text{ plus } 30 = 60$, $5 \text{ plus } 5 = 10$ and $60 \text{ plus } 10 = 70$. This procedure showed that John comprehended place value,

doubling and splitting two digit numbers ($35 = 30 + 5$). Also, because John's number sense was well developed, it enabled him to self-correct as shown by his comment about the incorrect answer to 7 plus 5.

It is also possible their backgrounds may have played a part in the development of their understanding of number and place value. Anna was a new migrant, who also visited her home country within six months of arriving in Australia. The general upheaval that this may have caused could have had an impact in Anna's development. In contrast, although John came from a non-English speaking background, he had a stable environment.

IMPLICATIONS FOR TEACHING

These two children show how diverse the knowledge and understanding of number facts can be in young children as early as Year 2. This variety provides a challenge for teachers who are charged with delivering the curriculum so that all children can achieve the appropriate standard.

All children need to experience a wide range of activities and opportunities to learn different strategies and approaches to computation. The great benefits in using mental computations are that the student needs to think and understand the numbers used to generate a strategy (McIntosh, 2004). In contrast, an algorithm may be successfully used, but it does not imply that the process is understood.

Number facts need to become part of a deep, connected web of understanding. Leutzinger (1999) suggested that an important strategy for children was to use number facts they knew, such as doubles facts, to assist them in finding answers to related facts. Number facts, especially bonds to 10, are also important, but children need to recognise and choose appropriate strategies. Dole and McIntosh (2004) suggested encouraging the use of activities that involve showing students the inverse relationship between addition and subtraction, to support the development of connectedness. As can be seen in [Figure 3](#), John knew and confidently used this relationship, whereas Anna's sense of number was still developing. According to Willis (2000, p. 33), this connectedness is necessary for "intelligent mathematical action." She went on to suggest that students like Anna, with their fragments of disconnected facts, are being let down by teachers and are placed at risk.

Both Anna and John could use number facts when prompted to do so, but tended to fall back on inefficient, naïve strategies when they were stuck. Although John, in particular, had a variety of approaches available to him, he did not necessarily choose the best method. These observations give support to Thompson's (2009) recommendation that students need to be given the opportunity to look carefully at the numbers in a problem before choosing their strategy.

Constant revision of work done previously also needs to be incorporated into lessons. To build mental computation comprehension and skills, children require time and experiences (Heirdsfield, 2004). Number based games permit students to practise mental computation strategies without the repetitiveness of worksheet practice (Asplin,

Frid, & Sparrow, 2006). The short, but focussed, intervention that John received resulted in changes in his number skills. Even Anna, when she returned to school, rapidly began to make progress, learning her doubles and recalling number facts. These findings suggest that practices such as number games with dice or games based on doubling and halving, could be effective home practices, as well as in the classroom.

The dynamic assessment process, or focussed interview, also has promise in the mathematics classroom. The practice of conferencing, in which a teacher discusses a student's work with the individual student, is common in the literacy classroom (e.g., Australian Institute for Teaching and School Leadership, 2012) but used to a lesser extent in mathematics classrooms. Since many teachers already use conferencing in literacy, it could be usefully extended into the numeracy domain. Certainly this approach revealed understandings about both John and Anna that might not have been possible from only looking at their written work or listening to rote responses, such as Anna's counting by tens. This was particularly evident with John's responses to questions about negative temperatures that resulted from an incorrect response to a computational question. From the perspective of useful information, however, dynamic assessment such as in this situation can provide surprising insights.

In any Grade 2 class there are children with different learning needs. Anna had some specific gaps in her understanding of number and could benefit from the use of concrete materials; John was a capable and self-directed learner who thrived when given opportunities to talk about his understanding. Teachers can capitalise on students' specific understandings by encouraging dialogue and discussion in the classroom (Callingham, 2008). Talking about mathematics, and sharing of different students' computational approaches, develops an appreciation of mathematics that goes beyond recall of number facts and builds mathematical proficiencies, such as fluency and reasoning, as expected in the curriculum (ACARA, 2012). One-to-one conferences are an opportunity to build both students' confidence and teachers' knowledge about individual students, but more general discussion and sharing among the whole class is also valuable. Teachers have a responsibility to accommodate all students, including students like Anna and John, through a range of interesting and appropriate activities. Teachers must actively intervene in number fact development. Some will occur naturally, as shown by Anna, but it is evident from this small study that teacher input is necessary for children to recognise and use the range of computational strategies that will allow them to be fluent, flexible and efficient calculators.

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ROBYN REABURN

STUDENTS' UNDERSTANDING OF VARIATION ON ENTERING TERTIARY EDUCATION

Researchers use statistics to make judgements about their data. Did the new drug work better than the old drug? What is the best combination of feed, temperature and water conditions for breeding abalone in an artificial environment? What methods of teaching fractions work? In all these situations, researchers only have access to a part of the population, a sample. It is not possible to examine all the people who will ever take a drug to see how it works, nor is it possible to test all the students who are learning about fractions. Unfortunately, a sample is unlikely to be exactly representative of the parent population. If, for example, the mean height of all Grade 12 students in Australia is 170cm, a sample taken from these Year 12 students is very unlikely to have a mean of 170cm. To complicate matters, if another sample was taken out of this population, it is quite likely that this sample mean will not only be different from the population mean, but will be different from the mean of the first sample as well. Despite this, it is likely that the sample mean will be close to that of 170cm. The sample mean is more likely to be 168cm, say, than 150cm.

As a consequence researchers have to make decisions about the results of their work knowing that their samples are unlikely to be exactly representative of the populations they are interested in. They also know that whereas the sample statistics are most likely to be close to the parameters of the population they are studying, occasionally a sample statistic may be obtained that is far from the population parameter. It is to deal with these problems that the discipline of inferential statistics exists (Wild & Pfannkuch, 1999). Inferential statistics acknowledges the fact that a decision about a population made from a sample is made with uncertainty, and uses the mathematics of probability to quantify the level of uncertainty that exists in the making of this decision.

Some of the common procedures in inferential statistics require the researcher to make a proposition about a population (the *null hypothesis*), take a sample from this population, and then judge if the sample is one that is likely to occur assuming the proposition was true. If a researcher has reasons to believe that a population has a mean of 175cm, and the sample mean was 150cm, the researcher may decide that this outcome is so unexpected that the population must be different from that first thought. Previous research shows, however, that in general, people have unrealistic ideas about the extent to which a sample may differ from the parent population and to the extent to which samples from the same population may differ from each other. They will also be unaware that even repeated measurements of the same quantity

will result in a variation in results, and be unaware that this variation is just owing to chance (Torok & Watson, 2000). This lack of awareness of the variation that exists between samples also extends to expectations of simple probabilistic processes such as tossing a coin. For even a small number of coin tosses (10 or less, say) people expect to get 50% heads and 50% tails, when it is more likely that some other proportion of heads will be obtained (Kahneman & Tversky, 1982).

Previous research shows that those people who have the most realistic views about the outcomes of simple probabilistic processes, such as coin tosses, are held by those who have most experience of these processes. In general, however, students in late secondary school have little experience in processes such as these and in taking samples (Rubin, Bruce, & Tenney, 1991). Therefore when they enter a tertiary course on statistics they find it difficult to make judgements about the variation that may exist between samples and between samples and their parent population. In formal statistical procedures the final conclusion is made by calculating the conditional probability of observing the sample statistic given that the proposition about the population is correct. It has been shown, however, that students often do not understand the reasoning behind these calculations and consequently just blindly follow the procedures and rules (Garfield & Ahlgren, 1988).

In the 1990s it was noted that previous research on students' understanding of statistics had concentrated on their understanding of measures of centre (averages) and that little work had been done on students' understanding of variation (Shaughnessy, Watson, Moritz, & Reading, 1999). It was suggested that this may have been due to the emphasis on measures of centre in school curricula, the extensive use of the arithmetic mean to make comparisons between data sets, and the reluctance of teachers to teach the concept of a standard deviation, which can be difficult for students to understand.

One of the early studies into student understanding of variation that followed asked students from Grades 4 to 12 to suggest a range of values for the number of red lollies that would result if 10 lollies were removed from a machine with a known proportion of red lollies (Shaughnessy et al., 1999). In this study the students were also asked to produce lists of possible proportions of the different colours in samples from this machine. Similar questions were also trialled in other studies on students from Grades 4 to 10 (Torok & Watson, 2000) and Grades 4 to 12 (Reading & Shaughnessy, 2005). These studies showed that some students gave most importance to the colour that predominated in the machine, without considering the proportions of the colours. In addition, while some students gave ranges for the expected number of a lolly of a particular colour that were too wide, some of the students in Grade 12, who had had exposure to probability in mathematics classes, gave predictions that were too narrow. These older students appeared to look at the questions as probability questions, rather than as questions where they were to consider what actual samples might look like (Reading & Shaughnessy, 2004).

In other studies on school students' understanding of variation students from Grades 3, 5, 7 and 9 were asked to predict the number of times out of 50 trials (or 10

trials for Grades 3 and 5) a spinner would land a shaded region that took up half the space (Watson, Kelly, Callingham, & Shaughnessy, 2003; Watson & Kelly, 2004). The proportion of students who answered this question appropriately was higher for secondary students (93.3% Grade 7, 86.7% Grade 9) than for primary students (38.9% Grade 3, 44.4% Grade 5). They were then asked if they would expect the spinner to land on the shaded region the same number of times as before if the spinner were spun for another 50 (10) times. For this question the rate of appropriate response was not higher for the secondary students. Over all the grades, 27.3% answered correctly by using the theoretical probability with an acknowledgement of variation. This was followed by a questions asking the students to nominate how many times landing on the shaded part would be surprising. It was found that the majority of students in Grades 5 (72.2%), 7 (86.7%) and 9 (66.7%) answered appropriately while those students in Grade 3 had more difficulty (44.4%). For the Grade 7 and 9 students this was followed up by a question asking them to judge which of three stacked dot plots representing results of the experiment were real or fake (Watson et al., 2003). These dot plots were designed to see if students could recognise that a plot with a symmetrical pattern and one with too much variation would be unlikely to occur.

In this study, first-year tertiary statistics students were given a series of tasks based on the work of Watson et al. (2003) to assess their appreciation of variation in the outcomes of a spinner that had a 50% chance of the desired outcome. They were also asked to determine which of three stacked dot plots appeared to be genuine and which appeared to be faked. One of these dot plots presented realistic results, one had a strictly symmetrical pattern and one showed a range of outcomes that was unrealistically wide.

METHODOLOGY

The participants of this research were 75 volunteers from four semesters of a first year tertiary statistics unit. All had successfully completed either a pre-tertiary mathematics course or a calculus bridging course. Seventy-six per cent of these indicated that there had been some exposure to statistics in their previous mathematical experience.

These questions were part of a more extensive questionnaire about their understanding of probability and statistics on entering university (Reaburn, 2011). This questionnaire was administered during the first week of the unit. The first part of these questions described here (Part A) referred to a spinner which has a 50% chance of resulting in an even number (Figure 1).

The second part of these questions (Part B) asked the participants to look at three stacked dot plots that supposedly reflected the results of the members of three tutorial groups who had used the spinner 50 times. They were then asked to indicate which results were "real" and which were "made up". The first plot was exactly symmetrical; the second showed data that showed too much variation (with other

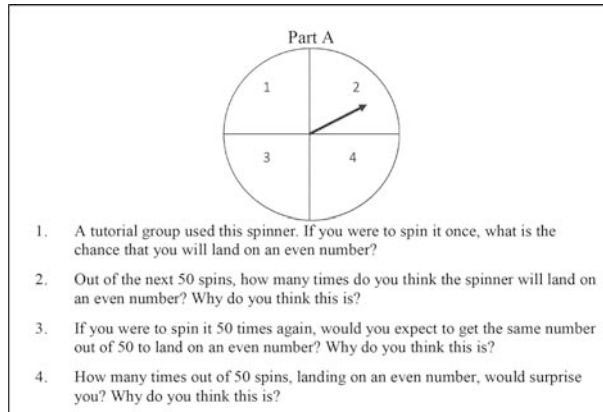


Figure 1. The spinner and the questions for Part A of the student tasks.

problems) and the other showed data that could be expected from such a trial. The plots and questions are shown in [Figure 2](#).

The participant answers were rated based on the SOLO taxonomy (Biggs & Collis, 1982) where they were not only marked on being correct or incorrect, but were given scores according to level of reasoning given. Therefore a student who said Tutorial B was made up because the range was too wide would receive a score of '1.' A student who said Tutorial B was made up because the range was too wide and there were too many results on the same numbers with gaps would receive a score of '2.' This allowed the answers to be subject to a Rasch analysis using the partial credit model (Masters, 1982), where the difficulty of the questions and the ability of the students were placed simultaneously on unidimensional scales. Rasch analysis provides "genuine interval measures ...so that Rasch estimates of ability/attitude/difficulty become the data for statistical analysis" (Bond & Fox, 2007, p. 5). The provision of these interval measures allowed the median ability of the students to be compared across the four semesters by the use of the Kruskal-Wallis test. The Mann-Whitney U test was used to compare the median scores of the questions by gender and whether or not the participants claimed to have previous statistical experience.

RESULTS

There was no significant difference in mean participant ability between the four semesters ($P > .05$). There was also no significant difference in the median score for any of these questions by semester ($P > .05$), gender ($P > .05$), or previous statistical experience ($P > .05$).

STUDENTS' UNDERSTANDING OF VARIATION ON ENTERING TERTIARY EDUCATION

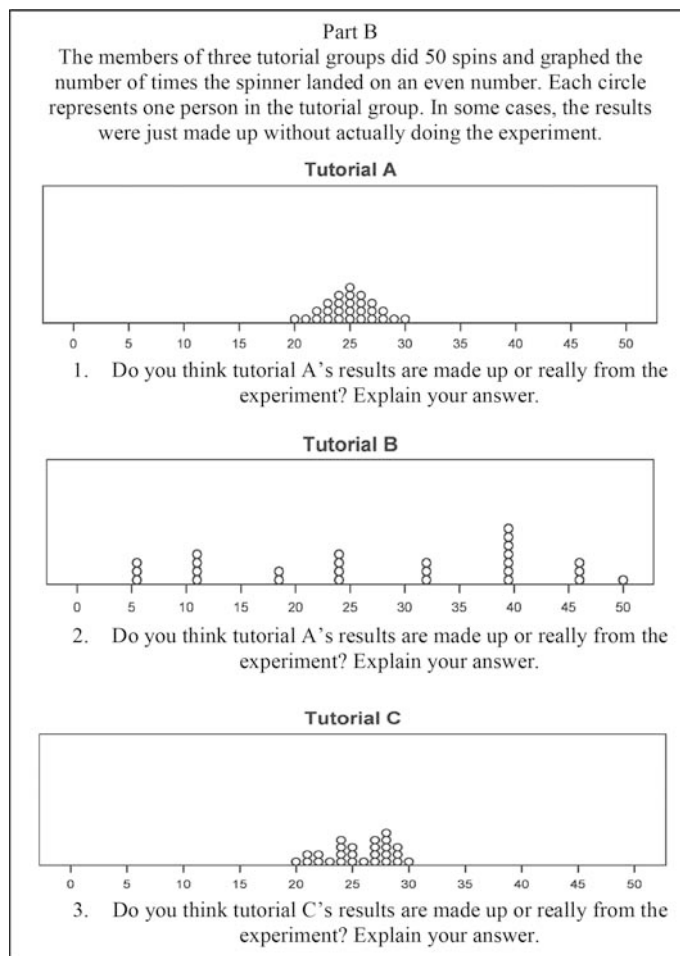


Figure 2. The tasks for Part B.

Part A

Question 1. 73 out of the 75 participants correctly indicated that the probability of the spinner landing on an even number is 50%.

Question 2. Fifty five per cent of the participants indicated that they would expect 25 even numbers out of 50 spins with no suggestion that the number might vary. For example:

25, as there is a 50% chance of the spinner landing on an even number

R. REABURN

Thirty two per cent of the participants used arguments that combined the probability of the outcome with an acknowledgement that the outcomes may vary, for example:

About 25, with some room for variation.

Some of the participants (5%) seemed to believe that randomness means that there is no structure to such situations

You can't tell as it is random.

Question 3. Question three was phrased so that the students would be prompted to think of variation. Despite this prompt, however, 21% of the students indicated that they would still expect to get 25 even numbers out of 50 spins. With these students their knowledge of statistical independence appeared to detract from a consideration of variation. For example:

Yes, the probability of landing on an even number does not change. It is an independent event.

Sixty-nine percent of the students indicated that they would expect the number to vary, while the others did not answer. The first student quoted below had a different perspective of randomness from the student quoted above who intimated that "you can't tell". The second student considered the difference between the theoretical and practical outcomes, whilst the third student considered the question as a sampling problem.

No, because it is random. But I would expect it to be close.

No, since theoretical and practical results rarely coincide exactly.

No, because no 2 samples are ever exactly the same.

Question 4. It was not expected that the students would necessarily be aware of the binomial distribution and be able to carry out calculations using this distribution. All that was expected was that the students would give some thought as to what would be an unlikely number of even numbers in this situation. Therefore any response that suggested that close to 35 and above or 15 or below would be surprising was considered acceptable. [Table 1](#) indicates that only 12% of the students gave answers in this range. Twenty eight percent stated either above 35 or below 15, but not both. Twenty nine percent only expected that either 50, zero, or both 50 and zero evens would be surprising.

The wording of the question has possibly led to some ambiguity, as it stated "How many times out of 50 spins, landing on an even number, would surprise you?" so students may not have thought that a range was being asked for. Despite this, some of the students did think that any number of evens could be expected:

Any number of times is not surprising.

50 on odd/even would surprise me. But everything in between would eventually even out a 50/50 split. Every spin is random then it would be unlikely but not impossible to get all odd or even.

STUDENTS' UNDERSTANDING OF VARIATION ON ENTERING TERTIARY EDUCATION

Table 1. Answers to Question 4

<i>Answer</i>	<i>Number of students</i>	<i>Proportion of students</i>
Above 35 AND below 15	9	12
Either above 35 OR below 15	21	28
Zero only	4	5
50 only	14	19
25 only	2	3
Other single number	6	8
Zero and 50 only	5	7
No number is unexpected	4	5
No response	4	5
Idiosyncratic	6	8

Idiosyncratic – the answer either did not address the question or was unintelligible

Part B

Tutorial A. Sixty nine per cent of the students stated that the results were made up, on the basis that something so “perfect” would not be expected.

They are too perfect – it’s unrealistic to get such neat results.

It looks like a perfect example of what is predicted to happen. Real results would have more variation.

In contrast, 17% of the students stated that the results were real, on the basis that the results were symmetrical. A small number of these students used the normal distribution in their reasoning:

It follows a bell shaped curve.

Normal distribution of results around the mean.

Tutorial B. The results may look more realistic on a quick glance but closer examination reveals that there are several problems. Firstly there are no 25s at all, there are multiple results on the same values, and there are supposedly 6, 46 and 50 even numbers received out of the 50 spins. Sixty one per cent of the students stated that the results were made up giving one or more of these reasons.

As there are too many results at the higher and lower end of the scales and not enough in the middle. Very, very small chance of getting 50.

Possible – but not probable, 7 people getting 39, and the fact that nearly all numbers have multiple dots, and out of 50 possible solutions, it’s highly unlikely to have the above arrangement.

R. REABURN

Twenty nine per cent of the students suggested that the results were real, half of whom used the argument that the results were more diversified than A.

This kind of data is a lot more random and would be more like real data.

For these students it was not clear from their answers whether or not they had just looked at the overall pattern, or actually looked at the numbers on the x -axis. The remaining students did not answer this question.

Tutorial C. Sixty three percent of the students stated that the results were real basing their argument on the fact that the range was centred on 25 and that there was some, but not too much variation.

It centres close to the expected outcome but is still random and thus seems most realistic.

To me this seems like a real graph as the results are varied about the average of what you would expect them to be.

Eleven percent of the students, however, stated that the range was too narrow:

Made up, the range is really small, little variation.

The remaining students gave no answer or an idiosyncratic answer.

DISCUSSION

The discipline of inferential statistics only exists because variation exists. Yet this study showed that on entering university, even though almost all the students had successfully completed pre-tertiary mathematics, approximately one fifth of them did not expect variation in the outcomes of a simple process that depends on chance. This may be, as Reading and Shaughnessy (2004) suggest, because the students' previous work on probability has led students to think of the questions in Part A solely as probability problems. It may also be because students do not have experience with processes that depend on chance. On being asked to suggest surprising outcomes, only 12% of the students thought of both of ranges that were both 'greater than' and 'less than.' This may be a result of the wording of the question, as 28% of the students made reasonable predictions thinking only of one side of the problem. Forty two percent of the students had unrealistic ideas of what would be unexpected. In addition, 17% of students stated that a graph of the outcomes of this process would be completely symmetrical.

There were some indications that students experience in formal probability and statistics led to error. For example, some of the students used their statistical knowledge to say that the graph for Tutorial A would be real because they expected to see a bell (normal) curve. Other students used their knowledge of statistical independence to suggest that they would get 25 evens out of 50 spins if the experiment were repeated.

STUDENTS' UNDERSTANDING OF VARIATION ON ENTERING TERTIARY EDUCATION

These students show they have some formal knowledge of statistics, yet would appear to think that random processes follow the predictions come about by probability calculations too strictly. In contrast, other students stated that getting 49 or 50 even spins out of 50 spins were likely events. These misunderstandings are possibly reinforced by Mathematics curricula, which tend to emphasise measures of central tendency at the expense of measures of variation. For example, the national curriculum for Mathematics has little on variation apart from the formal calculation of the standard deviation. This curriculum also does not emphasise the practical taking of samples that can give students experience in the variation that results between samples. Exceptions are found in Year 6, where it states that the students should conduct repeated trials of chance experiments, identifying the variation between trials and in Year 8, where it states that students should explore the variation of means and proportions of random samples drawn from the same population (Australian Curriculum, Assessment and Reporting Authority, 2012). However, the studies by Torok and Watson (2000), Reading and Shaughnessy (2004) showed that as students gain more knowledge of formal probability in late secondary school this knowledge may detract from considering the extent of variation in processes that are based on probability. The concern is that the benefits of such practical exercises in these earlier years of education may be lost as more formal statistical analyses are introduced in later years.

The results of this study have implications for statistics instructors. Instructors may be assuming that their students have a knowledge and experience of variation that they do not have. Students who expected the ranges to be narrower than is expected in reality they may not see that depending on the circumstances a sample mean of 160cm may be reasonable from a population of with a mean of 170cm. If they expect a sample mean to be the same as the population mean they will have difficulties in understanding the process of a hypothesis test, where the probability of a sample statistic is calculated under the assumption that the population parameter has a certain value. In addition, those students who think that even the most extreme outcomes are likely in a sample will also have difficulties in understanding the process of a hypothesis test as they may not see that while theoretically any sample within the limits of the population is possible, some samples are much more likely than others.

Whilst studying formal inferential statistics students will be exposed to sampling situations that are much more complex than the examples used in this study. It could be helpful, therefore, to encourage students to take samples from a given population and see the results. With the number of simulation exercises freely available on the web this is easy to do, and even simulations using coin toss exercises can be beneficial.

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NOLEINE FITZALLEN & JANE WATSON

DEVELOPING A SEQUENCE OF LEARNING EXPERIENCES IN STATISTICS

Planning meaningful learning experiences in a discipline such as statistics, leads to a search for starting points both from a general learning perspective and from the developmental pathways known to contribute to understanding the content chosen. This chapter focuses on the design of a sequence of learning experiences that promotes the development of understanding of statistical covariation and associated graph creation and interpretation skills, facilitated by the software package *TinkerPlots: Dynamic Data Exploration* (Konold & Miller, 2005). The objective is to demonstrate the importance of the various structural perspectives that contribute to the planning of meaningful learning experiences in relation to learning about statistical covariation as an end point of a learning sequence that takes a developmental approach to introduce students to a variety of graph types. The staged introduction of graph construction and interpretation activities that align with expectations from the curriculum for a variety of graph types with increasing complexity and sample size, offer promise for the most successful learning outcomes for students (Fitzallen, 2012a). The software package chosen for implementation offers affordances that enhance the learning of additional statistical concepts as a consequence of taking an inquiry-based learning perspective.

BACKGROUND PLANNING

Connections to Real World Contexts

Using authentic contexts and data is particularly important in statistics education, as suggested by Gould, Kreuter, and Palmer (2006); Fitzallen and Watson (2010); and Langrall, Nisbet, Mooney, and Janssen (2011). It is also considered important to use real data from a context that students can relate to, particularly for primary school students. The Reality in Mathematics Education (RME) instructional design theory developed by Wiskobas and Freudenthal provides an overarching organiser for structuring statistical investigations that make connections to real world problems. RME is a guide for student learning that focuses on the development of abstract thinking (Stephan, 2009; Treffers, 1993). It allows students to be active participants in the learning process and promotes the development of learning experiences that start with rich contexts that provide real-life sources of mathematics. “The contexts thus serve not only as a source but as an area of application as well” (Heuvel-Panhuizen, 2009, p. 12). Although the context underlying a statistical question needs

to be meaningful and motivating to provide real data for analysis, students do not actually have to have experienced the situation but must be able to make thoughtful connections to the context. In addition, active participation is promoted when students make artefacts that are meaningful and useful to them (Bakker, 2004; Stephan, 2009).

The RME philosophy also suggests instruction should build students' reasoning gradually from the concrete to the abstract, through the use of manipulatives, diagrams, and other imagery to reinforce students' reasoning. It accommodates the use of graphing software packages because they place an emphasis on student construction of models and symbols to facilitate abstract thinking. Within the RME structure instruction is intentionally designed so that students reorganise their thinking progressively toward more abstract ideas (Stephan, 2009) and then relate those ideas back to the practical context of the situation in order to make sense of the statistical information in that context (Fitzallen & Watson, 2012). Such practices encapsulate a holistic view of learning and actively engage students in the learning process at a deeper level (Ramsden, 2003), thus addressing students' needs and facilitating successful realisation of educational goals and purposes.

Statistical Investigations

In order to focus on the relevant mathematical ideas of covariation, graph creation, and graph interpretation within the broader structure of RME, the *Model of Statistical Investigation* developed by Watson (2009) detailed in [Figure 1](#), is an essential element of learning sequences. Watson's model starts a statistical investigation with a question. The question sets the scene for an investigation and establishes the context from which the data collected are related. The Data Collection step provides the data that can be represented in a number of forms – numerical, pictorial, or graphical. The data are often reduced using statistical calculations of measures of centre and spread or graphical representations such as a scatterplot. At the final step of Inference, those representations or others are then used to make conjectures about other populations that recognise the uncertainty of the conclusions drawn. Uncertainty emerges from the Chance step of the model. Underpinning all the steps in Watson's statistical investigation model is the concept of variation.

The Data Analysis and Probability Standard of the *Principles and Standards for School Mathematics* (2000) puts an emphasis on developing statistical reasoning skills and calls for students to formulate questions and collect, organise, and display relevant data to answer questions; to select and use appropriate statistical methods to analyse data; and to develop and evaluate inferences and predictions that are based on data (National Council of Teachers of Mathematics [NCTM], 2000). Similarly Wild and Pfannkuch (1999) offer an extensive four-dimensional model that includes behaviours associated with constructing graphs within an inquiry-based learning perspective. The model relates to the way statisticians work and think statistically and applies to the way in which students engage in statistical investigations. It includes four dimensions:

DEVELOPING A SEQUENCE OF LEARNING EXPERIENCES IN STATISTICS

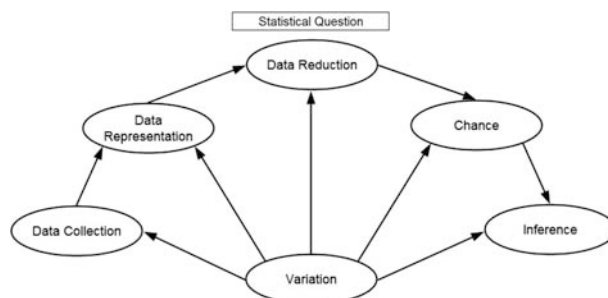


Figure 1. Model of Statistical Investigation (Reproduced from Watson, 2009, p. 91).

Dimension 1: The investigative cycle

Dimension 2: Types of thinking

Dimension 3: The interrogative cycle

Dimension 4: Dispositions

Dimension 1 is related to the thinking processes employed when working through a statistical investigation. This involves planning an investigation, collecting data, analysing data, and drawing conclusions. Dimension 2 is related to the types of problem solving strategies applied when working through a statistical problem. Wild and Pfannkuch (1999) posit that the types of thinking in this dimension are “the foundations on which statistical thinking rests” (p. 227). Dimension 3 adopts a cyclical process of data interrogation that involves thinking critically about the data in order to distil and encapsulate ideas and information. Dimension 4 includes the personal qualities, dispositions, and habits of mind employed when working with data.

Dimension 2: Types of Thinking of the Statistical Thinking Model is particularly useful when considering the way in which students work with data when creating graphs (Pfannkuch & Wild, 2004; Wild & Pfannkuch, 1999). The type of thinking most relevant to this chapter is transnumeration. Pfannkuch and Wild (2004) describe transnumeration as changing data representations to engender understanding, capturing the characteristics of a real situation, and communicating messages in data. The notion of transnumeration is extremely important as new technologies that incorporate interactive and dynamic commands as a way of working within software environments foster the manipulation of both data and data representations.

Curriculum Frameworks

In 2007, the American Statistical Association (ASA) commissioned development of the guidelines and curriculum framework detailed in the *GAISE Report* (Franklin et al., 2007). To support teachers to incorporate statistical activities into learning programs the *GAISE Report* curriculum framework utilises four problem solving processes that acknowledge the role of variation in statistics: Formulate questions,

Collect data, Analyse data, and Interpret results. It provides a developmental sequence of learning experiences that incorporates all four problem-solving steps across three levels of development. Although implicitly embedded in all levels of the framework when recommendations are made for the application of scatterplots, covariation, or “covariability” as it is termed in the framework, is included as a point of focus in Level B of the developmental framework. It is also applied in Level A when scatterplots are used to “observe association between two variables (p. 31)” and “look for patterns and trends” (p. 33) in data. At Level B the use of scatterplots is recommended for “measuring the strength of association between two quantitative variables” (p. 48) and “modelling linear association” (p. 51). Similar recommendations are made in Level C.

In the Australian context, *The Australian Curriculum: Mathematics* (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2012a) introduces the components of a statistical investigation throughout the curriculum, with graphing important at all year levels and the use of digital technologies first mentioned at Year 3. Mention of a “range of graphical displays” occurs in most years but consideration of scatterplots is not included until Year 10. This does not exclude the use of scatterplots to develop understanding of covariation with younger students long before scatterplots are mentioned explicitly.

Development of Understanding

Although curriculum documents identify the content to be covered at particular stages in students’ education, they do not provide explicit information about the sequence in which the concepts should be introduced to students and how the concepts may be developed within a learning program. To supplement this deficiency, Watson and Fitzallen (2010) provide hierarchical sequences of graph creation and graph interpretation that have the potential to contribute to the development of sequences of learning experiences. Their graph creation hierarchy involves four cycles of development. It begins with introducing the use of graphs for displaying data about one attribute in Cycle 1 [G1 in [Figure 2](#)], progresses to using graphs to summarise data in Cycle 2, which includes the use of graphs for comparing data sets and exploring the relationship between two attributes [G2]. Alternatively after Cycle 1, large data sets [G3] may be used for extending notions of graphing established in Cycle 1. Informal Decision Making for Graphs [G4] in Cycle 3 provides the opportunity to move from the construction and creation of graphs to using them purposefully to answer questions about the data. A time for consolidation and application is offered in Cycle 4 Graph Interpretation [G5]. The graph creation hierarchy can be used to determine students’ level of understanding of statistical concepts, such as distribution, covariation, and informal inference. It is applicable in its entirety or parts thereof, to all year levels of the compulsory years of schooling and beyond when students are required to use graphical representations to interpret data.

DEVELOPING A SEQUENCE OF LEARNING EXPERIENCES IN STATISTICS

Cycle 1	Concept of Graph [G1]	
Cycle 2	The Concept of Graph for Multiple Attributes [G2]	The Concept of Graph for Large Data Sets [G3]
Cycle 3	Informal Decision Making for Graphs [G4]	
Cycle 4	Graph Interpretation [G5]	

Figure 2. Map of cycles and levels of learning in the Watson & Fitzallen (2010) graph creation and interpretation hierarchy.

The Concept of Graph [G1] (Figure 3) in the Watson and Fitzallen (2010) graph creation and interpretation hierarchy includes the basic elements of a graph: Attribute, Data, Variation, and Scale. It suggests an order that describes the process of developing an understanding of the characteristics of a graph and the different levels of understanding that may be realised when drawing parts of a graph together to tell a story about the data. This reflects the findings of research of the importance of developing the ability to see data as an aggregate and gaining a global perspective (Ben-Zvi, Garfield, & Zieffler, 2006). At the relational stage, “students can create a meaningful picture/diagram with appropriate scale and tell the story of variation in the data and what it means for the attribute displayed” ((Watson & Fitzallen, 2010, p. 59). As a foundation for graph creation, The Concept of Graph [G1] underpins all the following cycles. An example of a graph created in this level is provided in Figure 4. The graph is a stacked dot plot created in *TinkerPlots*.

The Concept of Graph [G1]				
Relational stage	Combines all elements to create a representative graph			
Multistructural stage	Links 2 or 3 elements to create basic graphs			
Unistructural stage	Uses single elements unlinked			
Elements	Attribute	Data	Variation	Scale

Figure 3. Developmental sequence for the basic Concept of Graph [G1] (Reproduced from Watson & Fitzallen, 2010, p. 59).

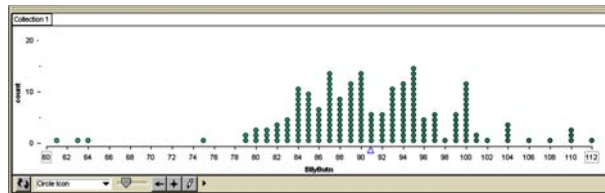


Figure 4. Stacked dot plot displaying the data for one attribute (Belly Button Height).

The second cycle of graph creation includes two sub-cycles: The Concept of Graph for Multiple Attributes [G2] (Figure 5) and The Concept of Graph for Large Data Sets [G3] (Figure 7). The Concept of Graph for Multiple Attributes [G2] emphasises the different types of attributes, introduces a variety of graphs, and establishes

the need for two dimensional representations to accommodate the measurement of more than one attribute for each case. At the relational level, “students can recognise among the graph types they understand, the one appropriate for particular associations between attributes and apply it to tell the story of the data” (Watson & Fitzallen, 2010, p. 59). An example of a graph created in this level is provided in Figure 6.

The Concept of Graph for Multiple Attributes [G2]				
Relational stage	Chooses and or creates appropriate graph for attributes and explains their application			
Multistructural stage	Creates graphs from elements: split dot plots, time series, line graph, scatterplots			
Unistructural stage	Builds elements, cannot combine into complete graphs			
Elements	The Concept of Graph [G1]	Types of attributes	2-D scaling	Relationship of two attributes to single case

Figure 5. Developmental sequence for the Concept of Graph for Multiple Attributes [G2] (Reproduced from Watson & Fitzallen, 2010, p. 60).

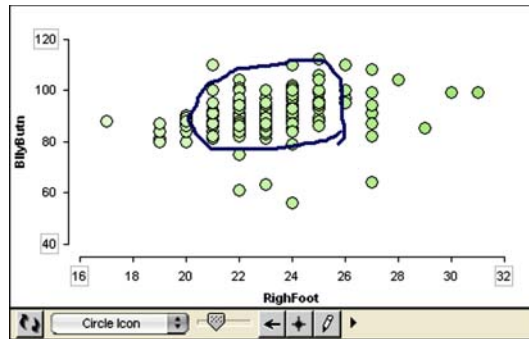


Figure 6. Scatterplot displaying the covariation of two attributes (Foot Length and Belly Button Height). The main cluster of data has been circled using the pencil tool.

The Concept of Graph for Large Data Sets [G3] (Figure 7) introduces large data sets, more complex graphical representations, and data reduction methods. At the relational stage, “students have the ability to select the appropriate graph for a particular data set and attribute” and establish an “integrated understanding of the various representations” used to interpret large data sets (p. 60). Figure 8 shows a graph that displays the relationship between two attributes – Gender and Belly Button Height. The Hat Plot tool in *TinkerPlots* has been used to summarise the data. The middle 50% of the data is covered by the “crown” of the hat plot. The brims to the left and right of the crown cover 25% of the data each. The Hat Plot is a precursor of the box plot. It is less complex and more accessible for younger students (Watson, Fitzallen, Wilson, & Creed, 2009).

DEVELOPING A SEQUENCE OF LEARNING EXPERIENCES IN STATISTICS

The Concept of Graph for Large Data Sets [G3]					
Relational stage	Chooses and or creates appropriate graph for attributes and explains their application				
Multistructural stage	Creates graphs from elements: histograms, cumulative frequency graphs, ogives, frequency polygons, box plots, pie charts				
Unistructural stage	Builds elements, cannot combine into complete graphs				
Elements	The Concept of Graph [G1]	Percentage	5-number summary	Area representing frequency	Equal interval grouping

Figure 7. Developmental sequence for the Concept of Graph for Large Data Sets [G3] (Reproduced from Watson & Fitzallen, 2010, p. 60).

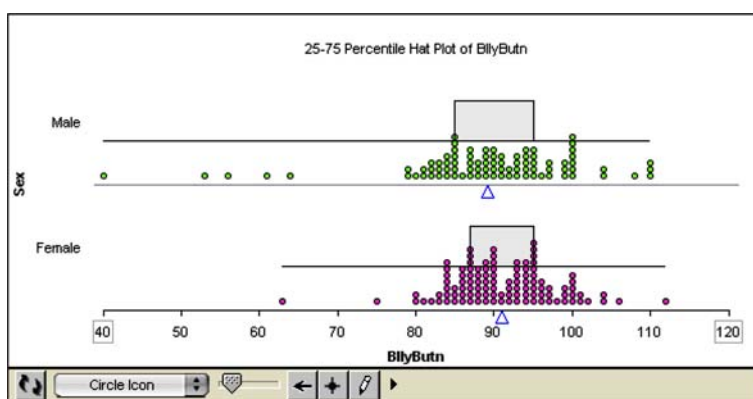


Figure 8. Graph displaying a large data set for two attributes (Gender and Belly Button Height).

The third level – Informal Decision Making for Graphs (Figure 9) potentially takes the graph creation process one step further and leads to students making informal inferences. It involves making decisions about creating and choosing appropriate graphs for a particular purpose and recognising the potential different representations have in assisting to draw conclusions and make informal inferences beyond the data. At the relational level, “all elements need to be integrated for completely justified conclusions to be reached” (Watson & Fitzallen, 2010, p. 61).

Informal Decision Making for Graphs [G4]				
Relational stage	Combines all elements as required by the question to reach an informal conclusion			
Multistructural stage	Combines two or more elements to reach partial informal conclusions for questions about a data set			
Unistructural stage	Appreciates elements in isolation, has difficulty combining			
Elements	Concept of Variation	Concept of Graph for Multiple Attributes [G2]	Concept of Graph for Large Data Sets [G3]	Concept of Average
		Concept of Graph [G1]		

*The term informal is used here to distinguish the hierarchy from one that would involve formal statistical tests.

Figure 9. Development sequence for Informal Decision Making for Graphs [G4] (Reproduced from Watson & Fitzallen, 2010, p. 61).

Figure 10 provides an example of a graph created in Level 4. It is a scatter plot displaying the covariation of two attributes, Height and Belly Button Height. The annotations on the graph were made with the pencil tool in *TinkerPlots*. The two horizontal lines at the top and bottom of the graph indicate the regions of the graph where the data would be considered outliers. The circled data are also considered outliers. The zigzag line that tracks the trend of the bulk of the data in the graph is used to indicate the relationship between the two attributes. The fluctuation in the line indicates that although there is a general trend between the two attributes there is recognition that there is variation evident within the trend (Fitzallen, 2012a). The stack of data points to the right of the graph indicate that there are cases in the data set that do not have data associated with at least one of the attributes.

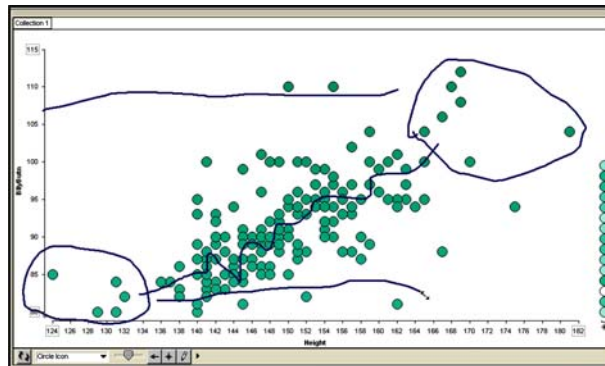


Figure 10. Scatter plot annotated using the pencil tool in *TinkerPlots*.

Watson and Fitzallen (2010) stress the importance of providing time for students to consolidate their understanding of graph creation and the role different graph types play in the data analysis process. Not only do students need to understand the elements of a graph but also they need to make connections to the context of the data to make meaningful conclusions and justifications. These aspects of learning also apply to another hierarchical sequence – Graph Interpretation [G5] (Figure 11). It is flexible enough to be applied as a further cycle of learning after consolidation of any of the Concept of Graph cycles and attends to the factors, such as outliers, that potentially impact on the shape of a graph. It also includes a questioning attitude element, which is required for critical thinking and development of statistical literacy skills necessary to interpret unusual or potentially misleading graphs so often encountered in the media (Watson, 2006). The complexity of graph interpretation tasks is determined by which cycle of Concept of Graph applies to the data and questions asked.

DEVELOPING A SEQUENCE OF LEARNING EXPERIENCES IN STATISTICS

Graph Interpretation [G5]					
Relational stage	Ability to question or draw implications from the graph by combining understanding of the elements present				
Multistructural stage	Consolidating the message in the graph based on the elements present				
Unistructural stage	Appreciation of the single elements as they appear in the graph presented				
Elements	Concept of Graph [G1-G4]	Concept of Variation	Concept of Average	Context	Critical Questioning Attitude

Figure 11. Developmental sequence for Graph Interpretation [G5] (Reproduced from Watson & Fitzallen, 2010, p. 61).

Data Analysis Software

Educational technologies provide many options for displaying data in graphical representations and improving student learning about statistical concepts (e.g., Ben-Zvi, 2006; Fitzallen & Watson, 2010; Shaughnessy, 2007). It is therefore pertinent to consider the graphical representations a particular software package affords when designing a sequence of learning experiences that promotes understanding of statistical concepts. The sequence of learning experiences developed in this chapter takes into consideration the innovative software package, *TinkerPlots: Dynamic Data Exploration* (Konold & Miller, 2005). *TinkerPlots* is employed as a tool for students to prepare graphs in order to demonstrate, support, and display their understanding of covariation, graph creation and graph interpretation. As a constructivist software created for students rather than statisticians, the software provides freedom for students to display their understanding in many ways (Fitzallen & Watson, 2010; Watson & Donne, 2009) and also to interpret presented graphs to identify covariation (Fitzallen, 2012b; Konold & Khalil, 2003). The potential to use *TinkerPlots* to make informal inferences has also been demonstrated (Watson & Donne, 2008).

Discussion of Background Planning

Incorporating all the notions explored in this section in a sequence of learning experiences is complex. To optimise learning opportunities it is important to embed learning of statistical concepts within real world contexts (Stephan, 2009; Treffers, 1993) and explore statistical questions via an inquiry-based learning process (Watson, 2009; Wild & Pfannkuch, 1999). Aligning learning outcomes with curriculum frameworks (ACARA, 2012a; Franklin et al., 2007; NCTM, 2000) is also necessary to provide the opportunity for the development of understanding of statistical concepts within software learning environments (Watson & Fitzallen, 2010).

As the targeted learning outcome of the sequence of learning experiences in this chapter is the development of understanding of covariation, it is also necessary to incorporate pedagogies that address the learning of that statistical concept. The notions in this section could accommodate other learning outcomes such as variation

and measures of centre. Regardless of the targeted learning outcome it is necessary to ensure any sequence of learning is informed by the curriculum, and previous research on the development of the statistical skills and ideas. These aspects of learning about covariation are addressed in the next section where an example of a sequence of learning experiences for covariation is presented.

SEQUENCE OF LEARNING EXPERIENCES

To address the specific statistical concept of covariation in a sequence of learning experiences, the fundamental notions of a teaching experiment based on using “growing samples” is applied (Ben-Zvi, 2006; Cobb & Gravemeijer, 2004; Cobb, McClain, & Gravemeijer, 2003). The lessons gradually introduce increasing sample sizes from the same population, reflecting the hierarchical framework for graphs in Figures 3 and 5. Each lesson requires students to make sense of the data as well as learn about the features of *TinkerPlots* that potentially support or influence their descriptions of the data and explanations of the conclusions drawn about the sample. Data sets of large and small sample size are compared and contrasted to explore the stability of variation and spread in the varying samples (Ben-Zvi). The lessons, based on explicit consideration of variation and Watson’s (2009) investigation model in Figure 1, provide the opportunity for students to think about how certain they are about their conjectures and conclusions drawn. In addition the lessons allow students to use their knowledge of the context to support their thinking and explain how the context of the data influenced their thinking, as advocated by Watson (2006) and supported by the RME instructional design theory (Treffers, 1993).

The sequence of learning experiences developed is made up of seven lessons. In Lesson 1, the intention is to get students to generate data by recording information about attributes familiar to them. Measurements such as height, belly-button height, and foot length are gathered easily by individual students and teachers can then gather large data sets from the CensusAtSchool data base using the random sampler accessed from the education section of the Australian Bureau of Statistics website. (www.abs.gov.au/censusatschool). The data in Lessons 2 and 3 are generated by the students’ class. Lesson 4 uses data generated from a second class (Class B) either at the same school or another school. In Lesson 5 the students are introduced to a data set (Class C) generated by the Australian CensusAtSchool database. The Class C data are used in conjunction with the Class B data to compare the two classes for a number of different attributes. Looking at the three data sets (Class A, B, C) collectively in order to compare classes, thinking becomes more abstract by Lesson 6. The focus in Lesson 7 is on comparing the results from interrogating a large data set ($n = 200$) generated by the CensusAtSchool database and comparing the results with those gleaned from the smaller data sets.

Although each lesson has a particular focus, the aim is to build students’ knowledge of and experience with data analysis and then understanding of

covariation by continually constructing various graph types and using a number of different data sets of different sample size in *TinkerPlots*. Throughout the seven lessons connections to the context of the data are made explicit by asking students to justify the conclusions drawn and the hypotheses made based on the context of the data and the questions explored.

The progression from small to large sample size and the connections to Watson and Fitzallen's (2010) hierarchy of graph creation and interpretation across the seven lessons are represented in Figure 12. In Lesson 1 the fundamentals of the Concept of Graph [G1] are established. By Lesson 7 there is the expectation that students will have encountered large data sets and constructed graphs to explore the relationship between two attributes, thereby, operating at Level 5 [G5] of the hierarchy to identify outliers, make informal inferences based on the graphical representations of the data, and express an understanding of covariation.

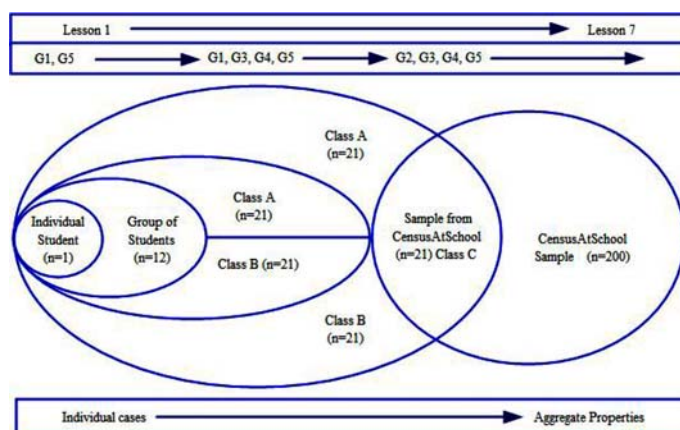


Figure 12. Change in sample size and lesson focus across the sequence of lessons.

It should be noted that the sequence of learning experiences does not detail when and how students learn about using *TinkerPlots*. Instructional advice about using the software package is not explicitly addressed because it has the potential to draw the focus away from developing an understanding of covariation to highlighting the technical issues associated with using *TinkerPlots*. Developing an understanding of using *TinkerPlots* is, however, implicitly embedded in the sequence of learning experiences through the use of multiple graph types – starting with stacked dot plots to display data for one attribute – and the need to construct various graph types and reconstruct them for multiple data sets. Constructing graphs noted in each of the lessons will facilitate beginners' use of *TinkerPlots* together with building their knowledge of covariation as they progress through the seven lessons. The details for each of the lessons are presented in Table 1 (Appendix 1).

Also worth mentioning is the issue that the seven lessons require students to develop an understanding of statistical concepts other than covariation. This is a consequence of adopting developmental and inquiry-based learning approaches. These approaches promote learning that makes the connections among multiple concepts instead of learning about individual concepts separately without the opportunity to acknowledge the connections among different statistical ideas.

CONCLUSION

The development of the practical learning sequence is embedded in an overarching organiser for structuring investigations undertaken by students because investigations are at the heart of statistics education (Watson, 2009; Wild & Pfannkuch, 1999). A related model for statistical investigations is then introduced and links to the curriculum and research are considered. In particular a framework for graphing is explored because of its intimate links to understanding covariation at the introductory level, which in turn leads to an acknowledgement of the contribution of increasing sample sizes.

Making strong connections to the curriculum is vital when planning learning sequences, not only from the perspective of covering all the required mathematical content at the appropriate time but also from the perspective of including the General Capabilities, which are “key dimension[s] of the Australian Curriculum, [and] are addressed explicitly in the content of the learning areas” (ACARA, 2012b, p. 3). The prominence of the General Capabilities in the Australian Curriculum places an emphasis on providing an integrated approach to learning that encompasses the development of seven capabilities that include critical and creative thinking, information and communication technology (ICT) capability, and numeracy. The sequence of lessons described in this chapter encompasses these three capabilities comprehensively by utilising a statistical investigative approach (critical and creative thinking) to focus on the development of understanding of covariation (mathematical content/numeracy) through the application of *TinkerPlots* (ICT capability). This has implications for the future implementation of *The Australian Curriculum: Mathematics* (2012a) as it provides a model that teachers could use to foster the integrated and interconnected mode of learning advocated by the curriculum.

Although the purpose of designing the sequence of lessons was to ensure a developmental approach was taken to the introduction and application of covariation for students, the approach taken could be applied to other content areas in the Statistics and Probability content strand of *The Australian Curriculum: Mathematics* (ACARA, 2012a). The use of increasing sample size and application of various graphical representations across the sequence of lessons would accommodate an explicit emphasis on other specific statistics content such as measures of centre as well as the big ideas of statistics such as distribution, variation, expectation, randomness, and informal inference.

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APPENDIX 1

Table 1. Sequence of Lessons

Lesson	Sample Size, Graph Framework, and Lesson Focus
1	<p>Data generated by individual students – G1, G5</p> <p>Using the features of <i>TinkerPlots</i> and creating stacked dot plots with bins on the horizontal axis initially, and changing the size of the bins. Creating horizontal and vertical value bar graphs. Describing the case-based representation of data. Making connections between the data in the plot and the data on the cards. Accessing reference lines. Exploring variation in an attribute. Discussing the variation in a small sample. Conjecturing about the likelihood of other samples of similar size having the same or different values based on the context of the data. Establishing how the context of the data influenced the data by considering how and from whom the data were collected.</p>
2	<p>Data generated by a class – Class A (n=21) – G1, G5</p> <p>Constructing graphs. Creating stacked dot plots and making the transition from the axis split into bins to using a continuous scale. Determining the range of the data. Describing variation and spread. Comparing values of data points. Using the mode as a reference point to describe the variation evident. Sorting data. Exploring the variation in other attributes. Comparing the spread and variation evident in the graphs and suggesting reasons for difference based on the context of the data. Hypothesising about where data points would be placed in the graph if new data were collected.</p>
3	<p>Data generated by two classes – Class A (n=21) Class B (n=21) – G1, G3, G4, G5</p> <p>Constructing various graph types. Creating split stacked dot plots with bins and continuous scales on the horizontal axis. Comparing groups. Identifying outliers. Accessing hat plots. Discussing the differences between the two data sets. Using the context of the data to justify decisions about outliers and support conclusions drawn from the graphs about the data.</p>
4	<p>Data generated by two classes – Class A (n=21) Class B (n=21) – G2, G3, G4, G5</p> <p>Constructing various graph types for various attributes. Creating scatterplots to display covariation. Describing the spread of the data. Identifying outliers. Removing outliers and then describing the changes to the spread and distribution of the data. Using hat plots to compare groups when comparing the data from the two classes. Using the context of the data to justify decisions about outliers and support conclusions drawn from the graphs about the data. Identifying covariation.</p>

(Continued)

Table 1. (Continued)

<i>Lesson</i>	<i>Sample Size, Graph Framework, and Lesson Focus</i>
5	<p>Data generated by Class B (n=21) and the CensusAtSchool sample (Year 5/6 students) – Class C (n=21) – G2, G3, G4, G5</p> <p>Constructing various graph types for various attributes. Creating scatterplots. Identifying the trend. Hypothesising about the placement of additional data points based on the context of the data. Making connections between the data points and value of the data points using reference lines. Describing the relationship between two attributes to explore covariation. Comparing Class B and Class C for various attributes and using the context of the data to justify decisions.</p>
6	<p>Data from Class A (n=21), Class B (n=21), and Class C (n=21) – G2, G3, G4, G5</p> <p>Looking collectively at plots from the three data sets and comparing classes using a variety of graph types. Identifying similarities and differences in the spread, distribution, mean, mode, median, and hat plots. Making suggestions for causes of variation from an understanding of the context. Thinking about the messages in the data and making inferences from the data based on the context of the data.</p>
7	<p>CensusAtSchool sample (Year 5/6 students) – (n=200) – G2, G3, G4, G5</p> <p>Comparing data sets, particularly the differences among small and large data sets for the same attributes. Making inferences from the data. Justifying statements about covariation and the relationships among attributes.</p>

SECTION 5

RESEARCHING LITERACY DEVELOPMENT

IAN HAY

LITERACY DEVELOPMENT: AN INTERACTIVE PERSPECTIVE

This chapter introduces the other two literacy chapters within this book (Hopwood, Hay & Dymont and Thomas, Thomas & Moltow) and supplements and extends the issues they identified. These three chapters adopt a contemporary perspective that literacy is a cognitive and reasoning process. The authors are supportive of the notion that an individual's reading and writing performances are interconnected and are on the same developmental and literacy/linguistic continuum. There are two core themes across the chapters, first is the need for teachers to be actively engaged with their students in literacy and the second is teachers need to be more proactive in their teaching of literacy. This need to be proactive is investigated from a Systemic Functional Linguistics (Martin, 2002) perspective by Thomas et al. and from a student centred perspective by Hopwood et al., with this chapter concentrating more on students' comprehension and reasoning strategies in literacy.

LITERACY IS A BROAD PEDAGOGICAL DOMAIN

Traditionally, literacy instruction particularly in reading has been framed within a rather narrow debate between the whole language approach on the one hand, with its focus on written text, and the phonological and decoding of words approach on the other hand. This debate has at times been referred to as 'the reading wars debate' (Pearson, 2004). Although this debate may still exist within the popular press, the evidence for this dichotomous perspective is being challenged, particularly by researchers investigating the brain development (Yang & Ping, 2012) and students' cognitive and literacy development (Saxton, 2010). Such a debate has its greatest significance in understanding children's initial reading development, but it is less relevant in understanding secondary students' literacy development. These shortfalls are indirectly reviewed in the Hopwood et al. and Thomas et al. chapters. It is not the intention of this chapter to repeat the content of these chapters; the aim of this chapter is to extend and supplement some of the themes identified.

Hopwood et al.'s research on students' transition from primary school into secondary school identified that this transition continues to be problematic. The concern is that for too many students their literacy development becomes stalled and even starts to go backwards at the start of their secondary education. Given the importance of both literacy and numeracy in contemporary society educators

need to recognise when and how to intervene in the learning process and ameliorate their practice to support students' development. Although not directly stated in the Hopwood et al. research, the authors are supporting a theory that students' literacy and English curriculum development have 'verticality' (Christie & Macken-Horarik, 2007; Grossman, 1990). The claim is that the English curriculum has 'verticality' in that for students their use of the English language becomes layered and more sophisticated over time. Thus the curriculum domain also has to have 'verticality' because the students' ability to read and write is built up through experience, practice and feedback. This is considered a gradual process as the English subject content changes and becomes more complex in structure across the years of schooling. From this perspective there is also a pedagogical emphasis on enhancing the quality and complexity of the text that students generate and read across the school years.

Focusing on persuasive writing Thomas et al.'s research is justified from two main sources, one being the results from national testing in the Australian schools and the second being the limited international research literature associated with persuasive writing. The Australian Curriculum: English, like many other international curricula, demonstrates a transition from a more narrative based literacy focus in the beginning years of schooling, to a more expository form in the higher secondary years (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2011; Holliday, 2010). In terms of writing there is also a transition in the English curriculum from a more descriptive writing form to a more purposeful and persuasive writing form in years five to eight. In persuasive writing there is a focus on the writer developing an argument within the text to express a particular viewpoint. In the Australian context recent national testing has identified problems in students' ability to write persuasive texts in the middle school years (Years 5-8) (ACARA, 2012). Thus, there has been more attention given to the teaching of persuasive writing in the middle years of schooling in Australian. The second reason for Thomas et al. to undertake their research may be based on the international literacy literature. At the conclusion of their extensive review of the evidence on students' literacy development Duke, Pearson, Strachan and Billman (2011) and Kucan and Palincsar (2013) argued that more research was still needed into the links between students' reading and writing and how to encourage different forms of writing. In addition, it was determined that more research was required to examine the knowledge that teachers utilised to engage students and to identify the specific practices that were most supportive of students' literacy development. Thomas et al. are doing this by linking students' writing development to the field of Systemic Functional Linguistics (Martin, 2002).

A Cognitive Model of Literacy Development

Theoretical constructs such as 'verticality' and Systemic Functional Linguistics (Martin, 2002), have their foundations in contemporary theory that the human brain has a high degree of plasticity and that learning, cognition, creativity, problem solving, and reasoning are reciprocal and interactive (Doidge, 2007). The old

conception of a right and a left brain working in semi isolation of each other has been challenged by the neuroscience that perceives the human brain as functioning as a complex but integrated system (Goswami & Bryant, 2007). For example, children with significant early reading difficulties have demonstrated deficits across multiple neuropsychological domains, including phonology, working memory, reaction time, rapid word naming, and fine and gross-motor skills (Nicholson & Fawcett, 2008). In terms of memory processing and learning acquisition, the contemporary theory is that within the brain, neural structures form networks that involve overlapping systems with differential connectivity (Yang & Ping, 2012). From this perspective a person's cognitive development is linked to his/her biological and neurological network development. These issues will be reviewed as they provide a strong foundation for teachers to understand why there is such a strong focus on engaging with students, talking and discussing literacy with students, and to see students' literacy development and the teaching of literacy as an active process.

This plasticity model of cognitive development and learning is, in part, challenging the notion of a fixed model where literacy learning is thought to be localised in one part of the developing brain and that this part responds better to one teaching method or approach. Support for a multi-modal and a multi-focussed literacy approach comes from research that has shown that many children with significant reading and learning difficulties have deficits in both phonological awareness and language skills (Hay & Fielding-Barnsley, 2006, 2009; Nicholson & Fawcett, 2008; Snowling, 2005). Whilst language delays are considered a cause of reading delays, children's lack of reading skills also have an ongoing negative influence on their vocabulary and language development (Catts & Kamhi, 2005; Fielding-Barnsley & Hay, 2012b; Hay & Fielding-Barnsley, 2006, 2009, 2011).

Teachers' orchestration of their students' talk, dialogue, turn-taking, and conversational timing are associated with enriching individual's language development (Blank, 2002; Zimmerman et al., 2009). Hay and Fielding-Barnsley (2012) have argued that students' language development can be enhanced when teachers are provided with instruction on how to alter their feedback and questionings to elicit from children: (i) more complex linguistic responses; (ii) more advanced vocabulary; (iii) improved comprehension; and (iv) greater confidence to interact with others and the content associated with the conversation. This orchestration of talk and dialogue between teachers and others has also been demonstrated to be effective with adult students, particularly those where English is the second language (Hay, Callingham & Wright, 2013). From this perspective, language development is considered to occur within a social context. Unfortunately, too often students' vocabulary development has been considered to be a separate skill and at times "taught" and transmitted to students away from its cognitive and semantic (meaning) framework (Goswami & Bryant, 2007; Winne & Nesbit, 2010).

The notion of identifying language and literacy development within a cognitive framework was theorised by Vygotsky (1978) and this theory has been demonstrated to be an effective framework in a number of research studies (Farkas & Beron,

2004; Hay, Fielding-Barnsley & Taylor, 2010; Price, van Kleeck & Huberty, 2009; Sénéchal, 2006). From this perspective, detailed analyses of students' responses to oral language interactions can be interpreted through at least three interactive lenses: (i) the cognitive 'level' of talk lens (Blank, 2002; Price et al., 2009); (ii) the number and length of oral utterances lens (Taylor & Pearson, 2004); and (iii) the interaction discourse lens, which looks at the number of conversational turns, the types of questions or prompts adults pose, and the types of children's responses elicited (Hay, Elias, Fielding-Barnsley, Homel, & Frieberg, 2007; Zimmerman et al., 2009).

Reciprocal Relationships

The reciprocal relationships among language, reading, writing, reasoning, and comprehension have significant implications for the type and range of instructions teachers provide for their students. In particular reading and writing are considered to be symbiotic skills with the generation of the text (the writing) one side of the coin and the decoding and comprehension of the text (the reading) the other side of the coin (Hay & Woolley, 2011; Kucan & Palincsar, 2013). With reference to the reciprocal relationships between the literacy variables, Hay et al. (2007) have demonstrated that a combination of oral language plus phonological intervention approaches enhanced children's reading skills, and Kendeou, Savage, and van den Broek (2009) have noted that children's oral language ability independently predicted children's reading fluency and reading comprehension two years after assessment. Fielding-Barnsley and Hay (2012b) have argued through their research that because students' language, vocabulary, and letter and word decoding skills are inter-connected, even when there is a stress on one of these dimensions, there is a transfer of skills to the other dimensions. That is, providing reading instruction that stresses word decoding and letter/sound knowledge improves students' comprehension of text and has an influence on students' spelling and writing ability. Similarly, providing reading instruction with blocks of written text and having the children articulate and understand the meaning of those words, improves children's letter/sound knowledge. The contemporary hypothesis is that an individual's reading and reading comprehension, whether at the letter and sound level, the word level, the sentence level, the paragraph level, or the whole text level, are interconnected and are on the same developmental and literacy/linguistic writing and reading continuum (Hay, 2013; Saxton, 2010; Yang & Ping, 2012).

Memory

A related issue in the conceptualisation of a literacy/linguistic continuum is the importance of automatization memory processing and reading (Nicholson & Fawcett, 2008). The assertion is that the reader's word recognition, reading fluency and reading comprehension are all influenced by the reader's automatization memory skills. For example, at the word level, a student's fast automatized phonological

processing skills connect the word and its visual/orthographic letter array with the phoneme (sound) of those letters (the 'alphabetic' principle). Children's automatization reading processing skills encompass at least three elements: (i) the long term memory; (ii) word meaning retrieval from the long term memory; and (iii) reading fluency (Nicholson & Fawcett, 2008). It is thus speculated that the core cognitive proficiency with literacy, language and reasoning is working memory (Baddeley, 2007) along with processing speed and capacity (Goswami & Bryant, 2007). From this perspective, people's reasoning, language, and social development cannot be easily separated from their ongoing and developing cognitive skills to store, organise, and retrieve information into long-term memory (Baddeley, 2007; Enfield & Levinson, 2006) with Lövdén, Bäckman, Lindenberger, Schaefer, and Schmiedek (2010) noting that a person's language usage, knowledge, memory, and processing efficiency are all highly interconnected within a person's cognitive functioning. This interconnection is seen as critical for an individual to be a flexible life-long learner and problem solver.

The evidence is that successful reading comprehension depends on the construction of a coherent representation of text in memory and this representation is formed when information in the text is integrated with the reader's background knowledge (Dooley, 2010; Hay & Woolley, 2011). When the reader has a coherent representation of the text it is easier to recall and retrieve information about that text from the long-term memory, that is, make inferences about the text and make causal connections about the context of the text, as it is read. These causal connections combine the different part of the text together and also link the content to the reader's background knowledge and knowledge of the vocabulary used in that text (Kendeou, Bohn-Gettler, White, & Van den Broek, 2008; McMaster et al., 2012). This linking process can be encouraged by teachers asking inferential questions (such as, who, where, how, when) and causal questions (such as, why, what was the consequence of that happening). These two types of questions act as prompts that facilitate the reader to reflect on the text and help make the text more meaningful, interrelated, and cohesive to the reader (Hay, Fielding-Barnsley, & Taylor, 2010; McMaster et al., 2012).

The assertion is that effective writing (Kucan & Palincsar, 2013) and reading for comprehension operate as part of an automatized cognitive network (Catts & Kamhi, 2005; Dooley, 2011; Saxton, 2010). This assertion is, in part, similar to Gough and Tunmer's (1986) notion of the 'simple view of reading' that proposes that children's oral language skills, plus their decoding skills, influence children's level of automatization and their comprehension of texts and words. For children where there are deficits in both the phonological word processing and the language (semantic) processing, the automatized networking is impaired and so the reading becomes slow and disjointed and comprehension is reduced. Consequently, those students are more likely to have spelling and writing problems (Duke et al., 2011; Goswami & Bryant, 2007). It is possible those students have what Wolf and Bowers (1999) have called a 'double deficit' and so are more likely to have reading and

comprehension difficulties. Traditionally, this population of students has been overly represented in intervention programs and one of the challenges for teachers across the years of schooling is the design of appropriate learning experiences, programs and resources for that cohort of students (Dooley, 2010, 2011; Epstein & Phillips, 2009; Hay & Woolley, 2011; Moni & Hay, 2012).

Effective Literacy Pedagogy

Both Hopwood et al. and Thomas et al. are interested in effective pedagogical literacy classroom practices and the links between students' comprehension of the text and the generation of the text. Based on research conducted by Hay and colleagues (i.e., Hay et al., 2007; Hay et al., 2013; Hay & Woolley, 2011) within an effective literacy program the teacher needs to systematically construct learning experiences for the students so that their students have:

- (i) background knowledge of the text;
- (ii) fluent word recognition and decoding skill associated with the words in the text;
- (iii) knowledge of the vocabulary and meaning of the words and phrases in the text;
- (iv) an understanding of how the text is constructed at the sentence level, paragraph level, to the whole of passage/book level;
- (v) opportunities to experience a range of texts and text forms;
- (vi) opportunities to discuss the text with others
- (vii) spend sustained time with one piece of text to master its content from the surface decoding level through to the inferential level where the reader is able to link the meaning of the text to higher order thinking tasks;
- (viii) opportunities to interact with, change, extend, and adapt the text as well as write similar text; and
- (ix) opportunities to investigate the narrative qualities of the text, the coherence of sequenced of story events, the quality of the characterisation, the use of macro-story structural devices (introduction, main idea, conclusion), development of theme, setting and story tensions, and the micro-structural devices, such as the within story-narration between characters.

The need for writing, reading and comprehension instruction does not stop in the primary schools, and students with poor literacy skills in primary and secondary schools are 'at risk' for school failure and are unprepared to effectively function in an increasingly literate intensive world (Wyn, 2009). Hopwood et al. contend that one of the challenges in maintaining secondary students' literacy standards, particularly as the demand for reading comprehension and writing increases across the secondary curriculum is effective transition from a primary school context. This is because the primary school setting is more orientated towards narrative text and oral reading in contrast to the secondary school context which is more expository

content text and writing focussed. It is also during secondary school that students need to be engaged more with creating persuasive text rather than narrative text and be able to quickly read and interpret persuasive text and understand how the author of that text has constructed it. Thomas et al. proposes that good persuasive text can be more effectively taught and assessed when the following dimensions are considered: audience; text structure; ideas; persuasive devices; vocabulary; cohesion, paragraphing, sentence structure, and punctuation and spelling.

Digital Texts

The need for readers to also be writers and creators of text is an important component of a literacy program, as literacy is a multidimensional, multimodal construct made up of different strands. In a digital age, one of those modes is digital with digital texts or e-texts becoming more common in schools and homes. Digital texts have the potential to motivate children to engage more with reading (Korat & Shamir, 2006; Marsh, 2011) because these texts contain features such as inserting notes, highlighting and bookmarking text options, retrieving of dictionary meanings, adjusting font size, translating text-to-speech, and following hyperlinks to other related texts and visual imagery. Walsh (2010) contended that such multimodal digital texts and images generated different cognitive pathways and processes, with young children who read and interpret visual text more likely to observe, classify and comment on those text forms. Walsh was concerned, however, that the digital texts alone were not sufficient, claiming that older students who were more exposed to such digital texts were less likely to engage in critical reading and a reflective evaluation of that text. Others have challenged this idea, with Kendeou et al. (2008) and Marsh (2011) being more supportive of digital texts and its ability to engage readers and facilitate critical reading by the reader. Certainly, research conducted by Cooney and Hay (2005) identified positive reading comprehension gains and improved students' attitudes to reading through the use of digital e-texts. The Cooney and Hay study identified that it was how the teachers interacted with the students that was the critical issue, and not the digital nature of the texts. Those teachers who had students with better reading and comprehension achievement outcomes encouraged their students to talk about the digital texts and seek additional information, to ask their students inferential and causal questions, and to get students to explore the meaning of words, read texts aloud, and revisit texts a number of times.

Teachers are increasingly expected to adapt their literacy program to accommodate social media tools, such as blogs, emails, Facebook and Twitter and use an ever increasing range of technology-based learning resources such as interactive whiteboards, ipads, and specialist software (Lê & Lê, 2012). As more of these resources become available, the teachers of literacy also need to be more discerning about the relevance and value of these resources and how or why these devices can be incorporated into their literacy program. For example, in response to concerns about the quality and the misinformation associated of some iTunes

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apps, particularly those associated with phonological programs, Fielding-Barnsley and Hay (2012a) developed the iTunes application, *Profs' Phonics* based on their evidence based research. *Profs' Phonics* was designed to provide a high-quality child-centred e-learning resource to facilitate early readers' vocabulary and phonological development.

CONCLUSION

It is argued within this chapter and those of Hopwood et al. and Thomas et al. that literacy involves active learning and active teaching because it is by students engaging “with the learning” and reflecting on their learning they are better able to develop that learning and their neurological network (Lövdén et al., 2010). Literacy is a multidimensional construct and so teaching literacy requires teachers to use a multimodal and a multi-focussed approach. The research discussed in this chapter supports the hypothesis that writing and reading needs to be conceptualised as being part of a reasoning process. Although there are new technologies and new digital resources, the teacher is still at the core of the learning process and plays an active role in the orchestration and development of students' ongoing literacy learning experiences.

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LITERACY AND STUDENTS' TRANSITION INTO SECONDARY SCHOOL

Educators and educational researchers are committed to better understanding the needs of young adolescents and developing the most effective and efficient ways to support students through school. One area which has received ongoing attention in the research field is adolescent students' achievement in literacy (Christenbury, Bomer, & Smagorinsky, 2009; Du Toit & Bouwer, 2009; Freebody, 2007). The aim of this chapter is to identify effective methods for supporting adolescent students' literacy development as they transition from primary school to secondary school.

This chapter begins with a review of the Australian national English curriculum, along with a review of the current transition issues as they impact on students' achievement in English. It then goes on to focus on identifying effective practices for supporting students as they transition from primary to secondary school, concluding with a discussion of future possibilities for improving the transition experience for students and teachers.

NATIONAL ENGLISH CURRICULUM

In the Australian educational context there is a national curriculum for the teaching of English that is designed to be implemented by all teachers from early preschool, to primary school, to Year 10 secondary school. This document has the potential to facilitate the effective transition of students from primary to secondary school English. Referring to the Australian Curriculum: English document:

The English curriculum is built around the three interrelated strands of Language, Literature and Literacy. Teaching and learning programs should balance and integrate all three strands. Together the strands focus on developing students' knowledge, understanding and skills in listening, reading, viewing, speaking, writing and creating. Learning in English builds on concepts, skills and processes developed in earlier years, and teachers will revisit and strengthen these as needed. (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2013a, para. 1)

This curriculum aims to be sequential and continuous across the different grades, and also to provide achievement and teaching content expectations. The following is an example of the standards and content to be covered in Year 7 of the curriculum.

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Literary texts that support and extend students in Years 7 and 8 as independent readers are drawn from a range of realistic, fantasy, speculative fiction and historical genres and involve some challenging and unpredictable plot sequences and a range of non-stereotypical characters. These texts explore themes of interpersonal relationships and ethical dilemmas within real-world and fictional settings and represent a variety of perspectives. Informative texts present technical and content information from various sources about specialised topics. Text structures are more complex including chapters, headings and subheadings, tables of contents, indexes and glossaries. Language features include successive complex sentences with embedded clauses, unfamiliar technical vocabulary, figurative and rhetorical language, and information supported by various types of graphics presented in visual form. (ACARA, 2013a, para. 5)

The expectation is that this English curriculum would facilitate the effective transition of students from primary to secondary school in this curriculum area. In reality, however, the indications are that teachers still have to interpret these statements and different school leaders are required to make choices around how much time, effort, resourcing and emphasis they place on different sections of the curriculum (Lingard, 2011; Moni & Hay, 2012).

LITERACY AND TRANSITION

Poor student performance in literacy and even poor transition from primary to secondary school cannot be understood in isolation. For as Wyn (2009) has reported on the Australian educational setting, that despite improvements in school 'effectiveness' over the last 20 years, the evidence from a wide variety of evaluations and sources shows that gains in students' levels of literacy, numeracy and school completion have largely tended to reflect socio-economic status and that those students who are less privileged and have fewer resources are consistently faring worse on educational measures over time. It is not that the students' low levels of literacy causes their poor transition into secondary school, rather it is that these two factors often have a common home background and socio-economic status connection. Thus, engaging students in secondary school and enhancing their literacy performance, have to be considered as related and linked problems, rather than separate issues.

LITERACY

The development of adequate English and literacy skills is now recognised as a complex process, whereby for many children, basic literacy skills are not achieved by the time they leave primary school (Lonsdale & McCurry, 2004). According to Luke, Comber, and Grant (2003) to be literate in today's world, students must be able to engage with a range of forms of literacy, including those that are required to

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decode print, visual and digital media. To be literate involves the individual engaging with many types of text and contexts to actively communicate, using media to gain information and process that information to communicate with others (Luke & Freebody, 2003).

One claim is that secondary school students' literacy levels are in decline, so much so that some secondary school students are failing to acquire adequate skills to successfully participate in the world of work (Goiran-Bevelhimer, 2008; Lingard, 2003; Mills, 2003). There is debate about the accuracy of this statement (Freebody, 2007; Lingard, 2011; Lonsdale & McCurry, 2004) but it is worth investigating the reasons that may explain this reported decline in secondary school students' English standards.

There are six reasons that may account for on-going poor literacy achievement difficulties with secondary school students, and these are:

1. a lack of program support for students with low levels of literacy in primary and secondary schools (Dugdale & Clark, 2008);
2. a lack of student motivation towards learning and engagement with literacy (Moje, 2008);
3. low socio-economic and home factors (Lingard, 2003; Wyn, 2009);
4. gender issues, especially with boys, and engagement with reading and writing (Mills, 2003);
5. secondary teachers overly focused on the teaching of specific content in a set way and not adapting their program to accommodate students' literacy levels (Freebody, 2007; Windle & Miller, 2012); and,
6. lack of knowledge by a large proportion of secondary school teachers on how to teach literacy skills and, in particular, comprehension skills (Nicholson & Dymock, 2010).

Point five and six are of particular interest to this chapter and suggest that many secondary school teachers, when compared with teachers in primary schools, are less responsive to the needs of students, and less skilled to meet these needs, as they transition into secondary school. Secondary school teachers have been reported to be less aware of individual students and are considered to be more curriculum content and assessment orientated, in part because they are required to teach curriculum content to a greater number of students across a number of grades (Jindal-Snape & Foggie, 2008; Hawk & Hill, 2001). In contrast, primary school teachers are reported to utilise a more supportive and integrated curriculum teaching approach (Smith, 2005; Topping, 2011).

LITERACY TRANSITION

Hay and Woolley (2011) have argued that many of the literacy strategies that have been effectively designed to facilitate primary school students' reading and writing development also need to transition across into the secondary school classroom.

These authors adapted parent and peer tutoring programs that have typically been used in the primary school setting, to the early secondary school years, along with using high interest but controlled vocabulary reading books and texts, and the teaching of comprehension strategies, such as locating the main idea in the text passage, and monitoring the vocabulary in the text. Accommodating students who do not have a full set of reading, listening, and writing skills to operate independently in the secondary school content area is a challenge to secondary teachers, but all secondary school teachers need to work with their students to maintain and improve the students' English skills. At a basic level, all teachers need to explain the vocabulary they use in their classroom, use a range of questioning strategies, and demonstrate to their students how to construct written text and how to summarise text (see Nicholson & Dymock, 2010; Woolley & Hay, 2007). Enhancing secondary school teachers' knowledge on how to teach English skills is likely to have ongoing advantages to students, for failing to acquire sufficient literacy skills is a major contributing factor associated with students leaving secondary school early and having ongoing social difficulties (Resnick et al., 1997; Smith, 2005; Snipes & Horwitz, 2008).

THE IMPACT OF TRANSITION

The transition phase has been described as a critical and complex period, characterised by the influence of social and institutional factors which can result in either a positive or negative experience for the individuals involved (Galton, Gray, & Ruddock, 1999; Smith, 2005; West & Schwardt, 2012). The evidence demonstrates that the transition phase can have a direct and indirect influence on students' academic, social and emotional development (Gallacher, Henderson, Hope, Husband, & Lindsay, 2003; Jindal-Snape & Foggie, 2008; Jindal-Snape & Miller, 2008; Zeedyk, Gallacher, Henderson, Hope, Husband, & Lindsay, 2003) and the claim is that successful transition into secondary school and into adolescence is associated with long-term positive outcomes for the individuals involved (Resnick et al., 1997).

The transition phase is associated with considerable change, with students at this point in their lives also undergoing a variety of both physical and emotional challenges that coincide with puberty (Ganeson & Ehrich, 2009; Simmons & Hay, 2010). Students' ability to cope with these changes is likely to have a significant impact on how they feel about school and how they progress through secondary education. Cox and Kennedy (2008) stated that for many adolescent students, transitioning is not only about adjusting to a new and often larger school environment, but it also involves adjusting to new ways of thinking, new teachers, new subjects, new peers, and different school expectations.

Research focusing on the impact of transition has identified that during this phase, many adolescents experience stress, low self-esteem, apathy, decreased motivation and a decline in positive attitudes towards school work and school life (Hay & Ashman, 2012; Moje, 2008; San Antonio, 2004; Wigfield & Eccles, 2002). The main areas of focus for researchers investigating transition have been in regards

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to students' perceptions and emotional experiences of transition, including self-esteem, anxiety and self-image (Cauley & Jovanovich, 2006; Mizelle & Irvin, 2000; West, Sweeting, & Young, 2008) as well as a focus on vulnerable groups including students from low socio-economic areas and students with low academic abilities (McGee, Ward, Gibbons, & Harlow, 2003; Reyes, Gillock, Kobus, & Sanchez, 2000; West et al., 2008).

The impact of the family and parents' perspectives surrounding transition are also well documented in the literature with supportive, engaged and informed parents facilitating a more positive transition experience for their children (Akos & Galassi, 2004; Zeedyk et al., 2003).

TRANSITION AND LITERACY ACHIEVEMENT

Cox and Kennedy (2008) have proposed that due to a greater focus given to the transition phase, student transition is now more organised and understood in schools, with students receiving greater support and preparation for the move to secondary school. Even so, many students continue to experience academic and social difficulties during the transition from primary to secondary school (Ganeson & Ehrich, 2009; West & Schwardt, 2012) with the claim that many Australian secondary school teachers are often unable to adequately adjust their program of instruction to accommodate the diversity of students entering secondary schools (Windle & Miller, 2012).

The international research surrounding the impact of transition on academic achievement presents substantial agreement that as students move from their primary school environment to their new secondary school location, a decline in academic achievement often follows (West & Schwardt, 2012). It should be noted that this decline is not experienced by all adolescent students; however, for a large number of adolescents and particularly those who are already at risk of underachievement, declines in academic capabilities are reported to be quite substantial. While previous researchers have attributed the decline in academic achievement to the onset of adolescence, McGee et al. (2003) have argued that this is not the sole influencing factor, as transition is experienced at different ages around the world where similar patterns have been identified in regards to academic declines. Similarly, West et al. (2008) have suggested that a decline in academic achievement is less associated with the anxiety experienced by students during transition but more to do with the decrease in motivation towards school and learning.

PROMOTING TRANSITION

The three main areas identified in the literature that promote students' transition are:

- continuity of the curriculum;
- communication between primary and secondary school staff; and
- appropriate transition programs.

Each of these will be discussed below, but while they are reported as separate factors, in reality these factors are interrelated and closely linked.

CURRICULUM CONTINUITY

Galton and colleagues (1999) reported that a great deal of attention has been given to the transition process itself, however relatively minimal attention has been paid to the discontinuities that exist between the primary and secondary curriculum and the pedagogical methods utilised at both the primary and secondary level. Such inconsistencies have been reported as one of the main contributing factors to the decline in academic achievement experienced by adolescents during the transition phase (Mizelle & Irvin, 2000). It is reported that it is not uncommon for secondary school teachers to begin the year with a “fresh start approach,” repeating work that has already been taught at the primary level, teaching at a level below the capabilities of many students, failing to build on the work done in the primary years and disregarding information passed on from primary teachers (McGee et al., 2003). These discontinuities and curriculum issues have been reported to influence the motivation levels of students and, in turn, their academic achievement (Jindal-Snape, & Miller, 2008; Wigfield & Eccles, 2002).

COMMUNICATION BETWEEN PRIMARY AND SECONDARY SCHOOLS

One of the main reported reasons curriculum discontinuity is prevalent between the primary and secondary systems is due to a lack of communication or liaison between primary and secondary staff (Cauley & Jovanovich, 2006). The claim is that there is minimal communication engaged in between primary schools and secondary schools and when information is exchanged it is dominated by administrative matters rather than curriculum and classroom requirements (Galton et al., 1999; Jindal-Snape & Foggie, 2008). Previous research has found that interaction and communication between primary and secondary school teachers and staff is minimal, particularly when teachers and staff are situated on different campuses with different school leaders (Hawk & Hill, 2001).

GENERAL TRANSITION PROGRAMS

Current literature which has focused on transition preparation and practice has revealed a consistent pattern in the types of programs used by educators in order to support adolescent students. Common features of transition programs include orientation or taster days, whereby primary school students visit a secondary school campus to familiarise themselves with the structure of the school and to meet their upcoming teachers, peer support programs run by secondary school students, school tours, parent information evenings and student talks given by Year 7 students about the secondary school experience (McGee et al., 2003).

LITERACY AND STUDENTS' TRANSITION INTO SECONDARY SCHOOL

Transition programs have commonly only lasted for a few days or weeks (Zeedyk et al., 2003). According to Cauley and Jovanovich (2006) transition programs need to be more holistic and focussed on students' ongoing social, emotional, and academic developmental over a longer period. Effective transition programs should include providing students and parents with information about secondary school, increasing the communication and collaboration between primary school and secondary school staff, primary and secondary school teachers having knowledge of the curriculum used in both the primary and secondary years and providing students with necessary social support. This is echoed in the literature which proposes that the more extensive the transition program, the more successful students will be in their first year of secondary school (Reyes et al., 2000).

IMPROVING THE TRANSITION EXPERIENCE

For many students, the social and procedural aspects of transition, such as familiarising themselves with the school environment, new teachers and new peers, are resolved within the first few months of secondary school, however academic challenges such as declines in literacy achievements can take much longer to repair (Akos & Galassi, 2004). Therefore, it is essential that schools utilise transition programs which bring primary school and secondary school staff together to address the gap that currently exists between the two school structures. Comprehensive transition programs that include opportunities for communication and curriculum continuity including numerous activities geared toward the needs and concerns of students and teachers are essential and have been suggested as effective methods in order to help students' social transition to a new school with less anxiety and greater academic success (Cauley & Jovanovich, 2006).

The Victorian Department of Education (2013) have designed a transition program (called START) that attempted to foster a positive transition for students from primary to secondary school. This program is in the form of workshop activities that teachers undertake with their students. The strategies and goals identified in the START program are reported below:

- increase visible teacher support to students;
- promote meaningful relationships between students and between staff and students;
- reduce the amount of environmental shifting between classes and other activities;
- promote students' self-efficacy through approaches that enhance goal setting, and mastery learning;
- enhance students' inter-personal problem solving skills;
- involve families in transition through provision of information, opportunities for discussion;
- enhance awareness of the role that parents can take to support school initiatives;

- provide professional development and opportunities for team support among teachers;
- enhance students supportive relationship skills and social skills that improve their connection to peers, teachers and family members;
- increase students' self-efficacy skills: skills for coping constructively with stress as well as the development of positive relationships;
- focus on students' academic self-competencies and self-concepts; and,
- focus on students' positive goal setting skills to encourage more optimistic thinking, a sense of direction and meaning in life.

The START program reflects the key themes in the literature and highlights the importance of curriculum continuity, communication and transition programs for ensuring both students and teachers are supported during the transition phase.

CONCLUSION

Students who transition into secondary school who are already experiencing difficulties in the academic domain are reported to be at a greater risk of failure in their secondary school years. Although there are a number of prominent studies and evaluations of best practice for approaching and supporting students through the transition phase, the impact of transition which focuses specifically on the literacy achievement of students has received relatively little attention. Discussions need to occur between both primary school and secondary school staff so that an approach to transition can be developed which reflects concern for academic attainment, particularly in the area of literacy. Specific attention needs to be given to the discontinuities in the curriculum, teaching approaches and the gap that currently exists between the primary and secondary environments. Transition is a complex issue in education, involving ideological issues, administrative issues, curriculum issues, and resource issues. Improving the transition experience of all students is a matter of concern for all primary and secondary teachers and it is a process that must involve the students, their teachers and their parents as key stakeholders. The Australian Curriculum: English states that:

The study of English is central to the learning and development of all young Australians. It helps create confident communicators, imaginative thinkers and informed citizens. It is through the study of English that individuals learn to analyse, understand, communicate with and build relationships with others and with the world around them. The study of English helps young people develop the knowledge and skills needed for education, training and the workplace. It helps them become ethical, thoughtful, informed and active members of society (ACARA, 2013b, para. 1).

In order for students to achieve these goals and be equipped for future success, supporting students during the transition phase is essential and plays an important

role in developing the understanding, attitudes and capabilities of those who will take responsibility for Australia's future.

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DAMON P. THOMAS, ANGELA THOMAS & DAVID MOLTOW

ENGAGED YOUNG WRITERS: DIALOGIC CHOICES BEYOND NAPLAN

Since 2008, it has been compulsory for all Australian students in Years 3, 5, 7 and 9 to complete a number of standardised tests known as the *National Assessment Program – Literacy and Numeracy* (NAPLAN). Completed yearly, the NAPLAN tests are designed to assess students' reading, writing, language (spelling, grammar, and punctuation), and numeracy skills (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2010). Although the written component of the literacy assessment tasks focused on narrative writing in 2008, 2009 and 2010, the 2011 test required students to write persuasive texts for the first time. The linguistic demands of persuasive writing differ considerably to those of narrative writing, and by turning to the field of Systemic Functional Linguistics (SFL) there can be found explicit descriptions of how and why texts persuade their audiences (Martin, 1985, 1995). Within the interpersonal metafunction of SFL, a system known as ENGAGEMENT¹ is concerned with the “subjective presence of writers in texts as they adopt stances towards the material they present and those with whom they communicate” (Martin & White, 2005, p. 1). This chapter seeks to explain how young writers can cater for a range of dialogic positions through the analysis of one student's response to a NAPLAN sample prompt, in preparation for the 2011 NAPLAN test. In addition to making this text publicly available on their website, NAPLAN released the marking guidelines used to assess students' texts, along with example analyses. In this chapter, the selected text is analysed using the ENGAGEMENT framework, in order to examine the dialogic choices made by one high scoring student, and to explain how this can assist educators to unpack the NAPLAN assessment criteria.

THE NAPLAN MARKING GUIDE

The publicly available NAPLAN marking guide suggests ten criteria for educators to focus on during classroom teaching, and provides example analyses which use these criteria to assess high scoring texts written by anonymous young writers. Each criterion is divided into a number of point categories, with less points awarded for lower standards of writing, and more points awarded for higher standards of writing. For example, the first criterion – known as *Audience* – is concerned with the writers' abilities to orient, engage and persuade their audience, and is stressed as an important aspect of the persuasive writing process (ACARA, 2011). *Audience* is divided into

six point categories, from a limited understanding of audience expectations, to influencing the audience by precise and sustained language choices and persuasive techniques. Unfortunately for educators working with this guide, there is little available to unpack specifically what those descriptions mean, let alone how such techniques might be taught. For educators facing this and/or similar challenges, the SFL tradition provides system networks for many aspects of language that can be useful pedagogic and analytical tools for the classroom.

THEORETICAL BACKGROUND

SFL is based on the notion that language is functional and operates in a context of situation (Halliday & Hasan, 1985). Halliday and Hasan state that language simultaneously functions in three ways, known as *metafunctions*, each defined as “part of the system of a language – the particular semantic and lexico-grammatical resources – that have evolved to perform a function” (p. 44). In his description of developments in SFL, Martin (2002) explains the role each *metafunction* plays in language, with the *experiential* metafunction relating to the “construction of institutionalised activity,” meaning the social actions which take place involving language; the *interpersonal* metafunction relating to the “enactment of social relations,” referring to how the people involved take part in the social action; and the *textual* metafunction relating to “information flow across media,” meaning how language is represented in the social action (p. 56). This chapter is concerned with unpacking one student’s use of linguistic resources to persuade an audience, and focuses on the *interpersonal* metafunction.

Within the *interpersonal* metafunction is a theory known as Appraisal (Martin & Rose, 2003; White, 2005), “a particular approach to exploring, describing and explaining the way language is used to evaluate, to adopt stances, to construct textual personas and to manage interpersonal relationships” (Martin & White, 2005, p. 1). Appraisal theory divides evaluative resources into three broad semantic domains, known as ENGAGEMENT, ATTITUDE and GRADUATION. Although each domain features a system network for analysing authors’ linguistic choices, a detailed analysis using each domain exceeds the scope of this chapter². As this analysis sought to describe resources used by one high scoring student to align and/or disalign their audience with diverse points of view, this chapter focuses on the ENGAGEMENT system, defined by Hyland (2011) as:

[A]n alignment dimension where writers acknowledge and connect to others, recognising the presence of their readers by focusing their attention, acknowledging their uncertainties and including them as discourse participants. (p. 182)

The ENGAGEMENT system is informed by Bakhtin’s (1981) influential notion that all verbal communication is *dialogic*, in that to speak or write reveals the influence of, refers to, or takes up what has been said previously, and requires the author to anticipate the responses of actual or imagined readers and listeners. White (2003) proposed a system network to explain the resources of ENGAGEMENT, as follows:

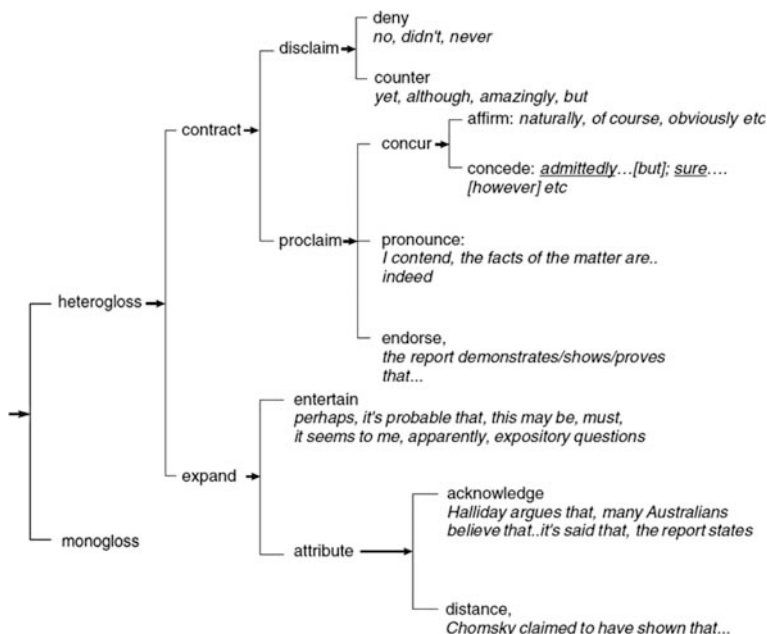


Figure 1. The ENGAGEMENT system (Martin & White, 2005, p.134).

Previous studies employing the ENGAGEMENT framework have focused on texts produced by journalists (White, 2003), politicians (Miller, 2004), academics (Mesa & Chang, 2010; Pascual & Unger, 2010), high and low scoring undergraduate students (Cominos, 2009; Lee, 2006; Swain, 2010; Wu, 2007), and undergraduate students who speak English as a second language (Feak, 2008; Hyland, 2007; Lancaster, 2011). To date, only a handful of studies have discussed ENGAGEMENT strategies used by primary and high school students³, and none have provided a rigorous account of ENGAGEMENT use across the years of schooling. Without a detailed understanding of how students use ENGAGEMENT strategies at different year levels, it is not possible for educators to know which aspects of this system are the most appropriate to focus on in their teaching. While this chapter only features the writing of one student from one year level, it is intended as an introduction to the sorts of ENGAGEMENT strategies young writers use, and how these can impact on the persuasiveness of an argument.

ANALYSIS

Introductory descriptions of the resources of ENGAGEMENT are presented alongside the following example analysis to assist readers to develop a basic understanding of the ENGAGEMENT subsystem, and to demonstrate how a successful student used

these resources to strengthen an argument. The text – entitled: “It is Cruel to Keep Animals in Cages and Zoos” – was deemed high-scoring by a NAPLAN marker, and was completed in preparation for the 2011 NAPLAN test. The analysis for each line in the student’s text is presented in [Table 1](#). If you are unfamiliar with ENGAGEMENT, it is recommended you read the student’s argument first, as the use of ENGAGEMENT resources employed in the text will be unpacked following the analysis. The key of abbreviated terms used in [Table 1](#) is as follows:

- M = Monogloss
- HC = Heteroglossic contraction, DISCLAIM
- DD = DISCLAIM/DENY
- DC = DISCLAIM/COUNTER, PROCLAIM
- PCA = PROCLAIM/CONCUR/AFFIRM
- PCC = PROCLAIM/CONCUR/CONCEDE
- PRP = PROCLAIM/REINFORCE/PRONOUNCE
- PRJ = PROCLAIM/REINFORCE/JUSTIFY
- PE = PROCLAIM/ENDORSE
- HE = Heteroglossic Expansion
- E = ENTERTAIN
- AA = ATTRIBUTE/ACKNOWLEDGE
- AD = ATTRIBUTE/DISTANCE

Table 1. ENGAGEMENT analysis of high-scoring persuasive text

<i>Line</i>	<i>M</i>	<i>HC</i>	<i>HE</i>	<i>Text Script</i>
1		PCA		So you think that you wouldn’t mind having bars surrounding you, faces peering in any minute of the day, and kept away from your natural habitat?
2		PCA		If humans can have a voice why can’t animals?
3			E	The statement suggesting that it is cruel to keep animals in cages and zoos, <u>I think</u> , is accurate.
4	M			Animals have roamed this land before the destructive race of humans.
5		DD	E	We <u>should not</u> have the right to take control of their lives.
6			E	<u>If</u> animals are kept in zoos and cages all of their life
7		DD		They have <u>no</u> chance if or when they are let out into the wild.
8			AD	Although some zoos <u>may claim</u> that they have technology to provide the prisoners with products to make their enclosures seem natural,
9		DD		It will <u>never</u> be the same.

Table 1. (Continued)

Line	M	HC	HE	Text Script
10	M			In the wild animals grow up learning to be predators
11	M			To catch their own food,
12	M			To know which animals are of danger to them,
13	M			And develop skills such as fastness and attacking methods.
14		PCA		What skills are they going to learn in a small enclosure?
15			AD	Zookeepers <u>may argue</u> that being kept in a cage increases the chance of survival and allows reproduction to continue.
16		PCC		<u>Even though this is true,</u>
17		DC		Rather than locking them away,
18			E	Humans <u>could</u> help by protecting their natural environment, preventing the amount of deaths by human progress.
19			E	<u>I hope that it would be agreed</u> that blaming the animals by locking them up for our mistakes is certainly cruel.
20	M			Like all living things, animals have personalities too
21		PRJ		<u>Which further more conveys why</u> zoos and caging animals is cruel.
22			E	In conclusion, taking animals away from their natural habitat <u>should be considered</u> cruel.
23	M			No human technology will <u>ever</u> be the same as their environment.
24			E	Humans <u>should understand</u> that the extent of human progress is ruining animals' lives.

When conducting an ENGAGEMENT analysis, the first line of distinction is drawn between the dialogically engaged *heterogloss* – utterances which acknowledge more than one view or opinion, and the undialogised *monogloss* – utterances which do not acknowledge this diversity (Miller, 2004). In other words, *heteroglossic* utterances show some ENGAGEMENT with alternative positions, other than that of the authorial voice. In the example analysis, there are three columns labeled *M*, *HC* and *HE* (Table 1). Here the *M* column indicates where the author used *monoglossic* utterances, while the *HC* and *HE* columns indicate the use of *heteroglossic* utterances. The major difference between *monoglossic* and *heteroglossic* utterances are detailed in Table 2. Although all *heteroglossic* utterances acknowledge dialogic alternatives, different resources are available for authors to *contract* or *expand* the space for alternative positions (hence *HC* and *HE*). Referring to the ENGAGEMENT system network, you will notice *contract* and *expand* as the line of distinction that

follows *monogloss* and *heterogloss* (see Figure 1). In this way, once a statement has been determined as *heteroglossic*, the next step is to determine whether it contracts or expands space for dialogic alternatives.

Table 2. *Monogloss and heterogloss*

<i>Term</i>	<i>Definition</i>	<i>Example</i>
Monogloss	No recognition of dialogic alternatives	In the wild animals grow up learning to be predators (line 10)
Heterogloss	Recognition of dialogic alternatives	The statement suggesting that it is cruel to keep animals in cages and zoos, <u>I think</u> , is accurate (line 3)

HETEROGLOSSIC CONTRACTION

When explaining the effects of dialogically contractive resources, Martin and White (2005) suggest that while they construe a dialogistic backdrop for the text of other voices and other value positions, they are directed towards excluding certain dialogic alternatives from any further communicative interaction as the text unfolds. Under this category the next line of distinction is drawn between resources of PROCLAIM and DISCLAIM (see examples in Table 3). Resources of PROCLAIM include formulations that act to limit the scope of dialogistic alternatives in the text, rather than directly rejecting or overruling them (Martin & White, 2005). This is achieved through one of three modes: CONCUR; PRONOUNCE; and/or ENDORSE.

Table 3. *Contractive subcategories – proclaim and disclaim*

<i>Term</i>	<i>Definition</i>	<i>Example</i>
PROCLAIM	Meanings by which dialogic alternatives are challenged or excluded through direct authorial involvement or emphasis	What skills are they going to learn in a small enclosure (line 14)
DISCLAIM	Meanings by which dialogic alternatives are directly negated or countered	... it will <u>never</u> be the same (line 9)

Resources of CONCUR acknowledge a dialogue by using certain wordings such as *of course*, or *naturally* to assume the audience and authorial voice hold the same position. An example of this can be seen with the following statement: *Of course, caging animals is unfair* (Table 4). Including *of course* within the statement presents the position as common knowledge, and positions the reader as being of the same opinion. Although they do not feature the same particular wordings, certain rhetorical questions achieve the same dialogic effect. For example, the analysis above begins with two rhetorical questions that imply the author and audience share one view on

the issue at hand. The first (line 1) assumes the audience will agree that zoos and cages are negative, by asking them to imagine *being surrounded by bars* (lacking personal space), *having faces peering in any minute of the day* (lacking privacy), and *being kept away from their home* (lacking freedom). This is immediately followed by another rhetorical question (line 2) construing animals as weak and/or powerless – as they lack a *voice* – which positions the audience to view this lack of power as an injustice. Interestingly, the author does not say: *If we can have a voice*, but rather: *If humans can have a voice*, which separates this group (*humans*) from the authorial voice and the so-far aligned audience.

Table 4. Resources of PROCLAIM

Term	Definition	Example
CONCUR	Formulations that announce the author as having the same knowledge as a projected dialogic partner	What skills are they going to learn in a small enclosure? (line 14)
PRONOUNCE	Formulations which involve authorial emphasis or involvement	<u>I contend</u> that caging animals is unfair.
ENDORSE	Formulations by which propositions sourced to external sources are construed as maximally warrantable	<u>Smith inarguably demonstrated</u> that caging animals is unfair.

One further use of CONCUR occurs when the author outlines a series of skills animals attain in the wild through *monoglossic* utterances before asking what skills animals will learn in a small enclosure (line 14). This positions the audience to view the zoo environment as limiting the natural development of animals, and thus strengthens the notion that an injustice is being committed. Here the rhetorical effect of concur is brought about through interactions with the *monogloss* which precedes it. According to Martin and White (2005), rhetorical questions such as these are dialogic in presenting the author and reader as being *in dialogue* generally, yet they contract dialogic space by assuming the reader will have particular responses.

Another resource of PROCLAIM, known as PRONOUNCE (Table 4), differs from CONCUR as it involves the authorial voice emphasising or explicitly intervening within the text (Martin & White, 2005). While resources of CONCUR assume alignment with the reader, resources of PRONOUNCE do not. While the student did not use PRONOUNCE in the text, an example can be seen with the following: I contend that caging animals is unfair. In this case, the use of *I contend* represents the direct intervention of the authorial voice within the text.

Resources of ENDORSE (Table 4) differ again, as they are involve propositions sourced to external sources being construed by the authorial voice as highly warrantable (Martin & White, 2005), as in the following: Smith inarguably demonstrates that

caging animals is unfair. Instances of ENDORSE acknowledge dialogue through attribution, yet position the reader to side with the argument of the authorial voice. As with PRONOUNCE, the author did not use ENDORSE in the argument presented.

Aside from the three modes of PROCLAIM, two modes of DISCLAIM – known as deny and counter – also serve to contract dialogue (Table 5). White (2003) explains deny as negation in the broadest sense, an example of which can be seen with the following example from the analysis: ... *it will never be the same* (line 9). DENY was used by the author multiple times in lines 5, 7 and 9. Considered separately, the author used this resource to negate alternative arguments about humans (our rights to control the lives of animals), animals (the chance for survival/prosperity if they are released), and zoos (whether living conditions will ever be comparable with the natural environment). Importantly, each use of the contractive DENY was preceded by expansive resources of either ENTERTAIN or DISTANCE. In this way, the three arguments about humans, animals and zoos are tackled by initially opening space for dialogue with expansive resources, before closing this space with DENY. In terms of audience positioning, this small section demonstrates the author considered alternative viewpoints regarding each of the major aspects of the topic, building solidarity with readers who may have come to the text holding such views, yet through the use of DENY the reader is aligned with the author's position.

Table 5. Resources of DISCLAIM

Term	Definition	Example
DENY	Formulations which introduce alternative positive positions into the text so as to reject it	Providing financial incentives <u>will not</u> make young people today less lazy
COUNTER	Formulations which represent the current proposition as countering a proposition that would be expected in its place	... rather than locking them away, humans could help by ... (line 17-18)

The other mode of DISCLAIM, known as COUNTER (Table 5), involves formulations that represent one proposition as countering another (Martin & White, 2005). An instance of this can be seen with the following example from the analysis: ... *rather than locking them away, humans could help by ...* (line 17-18). In this instance, the reader is aligned with the author's argument by the direct countering of a dialogically alternative point of view.

Between lines 16 and 24, the author used three dialogically contractive resources, to CONCEDE that not all views of zookeepers are unreasonable (line 16), to COUNTER the notion that locking animals away is the best course of action (line 17), and to JUSTIFY why caging animals is cruel (line 21). In each of these cases the author demonstrates

an awareness of the need to engage with the views of others – particularly of audience members who may hold alternative views – yet uses those resources to contract dialogic space and position the reader to accept the author’s point of view as the most reasonable.

HETEROGLOSSIC EXPANSION

In addition to dialogic contraction, White (2003) explains how authors can increase dialogic space for alternative positions through dialogic expansion. The text features the same number of contractive and expansive resources, and by exploring the author’s choices in using the expansive, it becomes evident how these resources are important in establishing points of solidarity with the reader. Under this expansive heading, a line of distinction is drawn between the resources of ENTERTAIN and ATTRIBUTE as described in Table 6.

Table 6. *Expansive Subcategories – ENTERTAIN and ATTRIBUTE*

<i>Term</i>	<i>Definition</i>	<i>Example</i>
ENTERTAIN	Formulations which make assessments of likelihood via modal auxiliaries, modal adjuncts, modal attributes, and certain mental verb projections	...humans <u>could</u> help by protecting their natural environment (line 18)
ATTRIBUTE	Formulations which attribute a proposition to some external source	Zookeepers <u>may argue</u> that being kept in a cage increases the chance of survival and allows reproduction to continue (line 15)

Consider the following example from the analysis: *...humans could help by protecting their natural environment* (line 18). Here, as White (2003) explains, dialogic expansion is achieved by the authorial voice representing itself as being open to – or *entertaining* – alternative dialogic positions, in this case with the use of *could*. Expanding dialogic space with ENTERTAIN construes a *heteroglossic* backdrop for the text which projects an audience that might be divided over the issue at stake. By dialogistically validating alternative viewpoints in this way, resources of ENTERTAIN provide for the possibility of solidarity with those who hold to alternative positions (Martin & White, 2005). The most common ENGAGEMENT resource in the example analysis is ENTERTAIN, used by the author numerous times during the first and final thirds of the text. These uses – often deployed alongside *monoglossic* or contractive resources – construe a *heteroglossic* backdrop for the text in which the position of the authorial voice is in potential tension with other dialogistic alternatives. In this way, the author’s use of ENTERTAIN projects an audience that may have come to the

text holding alternative views on whether zoos and cages are necessarily bad. By acknowledging these alternative views as at least partially reasonable through the use of ENTERTAIN, the author boosts the possibilities for solidarity with these members of the audience. As with the alternating pattern of DENY and expansive resources, the author uses ENTERTAIN to temper *monoglossic* utterances (lines 3 and 4), and the contractive PRONOUNCE (lines 22 to 24), which lessens the risk to solidarity otherwise caused by these other resources alone.

The other method authors can use to expand dialogic space for alternative positions is through the resource of ATTRIBUTE, which involves the “grounding of viewpoints in the subjecthood of an external voice” (White, 2003, p. 273) through one of two modes: ACKNOWLEDGE, which is modally neutral; or DISTANCE, which casts doubt on a proposition. An example of ACKNOWLEDGE can be seen in the following: *Johnson states that caging animals is unfair*. In this case, the authorial voice simply acknowledges the statement made by Johnson without an obvious stance on the issue. This resource was not used by the author of the example argument presented above. Despite this, the author made use of the other mode of ATTRIBUTE – known as DISTANCE – twice (see lines 8 and 15). Here the authorial voice distances itself from the propositions of others. In the first case (line 8), the zoo’s proposition about advancements in technology is framed by the word *claim*, which adds a sense of doubt to the credibility of this statement. This use of DISTANCE also acts to position the reader to accept the ultimate contraction of ‘never’ in the use of DENY which follows it. The second use of DISTANCE occurs when the author states: *Zookeepers may argue that being kept in a cage increases the chance for survival and allows reproduction to occur* (line 15). In this example, the author’s use of DISTANCE hints that a rebuttal is about to follow; countering the zookeepers’ proposition. In both cases, the author inserts an attributed dialogic alternative into the text, which – according to Martin and White (2005) – have the effect of lowering the interpersonal cost for any who would advance such alternatives, and are thus dialogically expansive as they open dialogic space for such positions. For both uses of DISTANCE, the author presented alternative propositions as questionable, before using contractive resources of DENY or COUNTER to align the audience with their position. The expansive subcategories are presented in Table 6.

While the author’s use of ENTERTAIN and DISTANCE served important rhetorical purposes, the text’s lack of the contractive ENDORSE and PRONOUNCE, and the expansive acknowledge detracts from the effectiveness of the text overall. These resources could have been used to bring in the voices of supporters – perhaps experts on the issue – to show the author acknowledged views from people on both sides of the argument which would make the text seem more objective. Despite this criticism, the young writer’s dialogic choices are impressive not only because they consist of a broad range of ENGAGEMENT resources, but also because their deployment of these resources often alternates between contractive and expansive to establish and protect points of solidarity with readers who may have come to the text with various views on the topic.

THE MONOGLOSSIC

According to Bakhtin (1981), the opposite of dialogised *heteroglossic* utterances are undialogised *monoglossic* utterances. *Monoglossic* utterances can be described as dismissive evaluations, introduced into a text via bare assertion. They are declared as absolute truth and provide nothing to suggest other explanations must be acknowledged or engaged with. In scientific discourse, Myers (1990) observed that bare assertions were rarely statements of new knowledge, but rather facts and established knowledge. Furthermore, the bare assertion frequently operates with the assumption of agreement between the authorial voice and the reader (White, 2003), yet although they are often presented as dialogically inert, there are often social contexts where bare assertions would be hotly disputed. The example text features a number of *monoglossic* utterances (see lines 4, 10, 11, 12, 13, 20 and 23). As can be seen with the first of these – *Animals have roamed this land before the destructive race of humans* (line 4) – these utterances provided no space for alternative positions, unlike the other examples highlighted in this chapter. They are presented as factual, as though they should be taken-for-granted, yet would likely be disputed in certain social contexts. Although previous studies into the use of ENGAGEMENT resources have suggested younger students use monoglossic utterances more frequently than older students who have better developed understandings of the need to engage with multiple perspectives (Christie & Derewianka, 2008), further research is needed to specify exactly when this greater understanding develops, and what it means in terms of the uptake of other ENGAGEMENT resources.

READER MODELLING

ENGAGEMENT choices also suggest reader modelling for texts, with the author of the example text not usually assuming the readers' agreement with their argument. One example of this can be seen when the author states: *I hope it would be agreed that blaming the animals by locking them up for our mistakes is certainly cruel* (line 19). This dialogically expansive utterance implies an audience that needs convincing. Similar to this is: *The statement suggesting that it is cruel to keep animals in cages and zoos, I think, is accurate* (line 3). In this case the use of *I think* highlights the position as the author's only, potentially separate from the readers' position. Rather than agreement, the author tended to model a value position for the reader that was at odds with the authorial voice.

Overall, the student's text was coded for 25 uses of ENGAGEMENT resources, consisting of nine dialogically contractive utterances, nine dialogically expansive utterances, and seven *monoglossic* utterances. Of the seven possible contractive resources, the student used five – AFFIRM, DENY, COUNTER, CONCEDE and JUSTIFY – at least once, and of the three possible expansive resources, they used two – ENTERTAIN and DISTANCE – at least once.

Table 7. *The NAPLAN assessment (ACARA, 2011, p. 65)*

<i>Criterion</i>	<i>Score</i>	<i>Annotations</i>
1. Audience	6	Controlled argument that uses persuasive devices deliberately and selectively, including engaging opening that addresses the reader in emotive language (bars surrounding you, destructive race of humans). Text appeals to readers' emotions, values and reason. Writing has strong voice.
2. Text structure	4	All parts are well developed. Strong introduction states position clearly. Body contains two points of argument that are elaborated and the conclusion reiterates position and makes a general statement that succinctly summarises this position.
3. Ideas	5	Text advocates for animal rights and freedom in the wild. These ideas are elaborated and contribute effectively to writer's position. Also develops position by refutation and making recommendations (humans could help by).
4. Persuasive devices	4	Devices suit style argument (predominantly emotive). They include appeal to reader, emotive language choices, modality (we should not have the right), emphatic statements (it will never be the same, certainly cruel), conditional mood (If animals are kept...) and rhetorical questions (If humans can have a voice..., What skills are they going to learn...?), and emphasis (should).
5. Vocabulary	4	Consistent use of precise words and word groups with some imprecision (amount of deaths, skills of fastness and attacking methods).
6. Cohesion	4	A range of cohesive devices enhance reading and support underlying relationship. These include clear referencing, connectives (if, if or when, even though, rather than, in conclusion), substitution (<u>it</u> will never be the same) and word associations (e.g., bars/enclosures/prisoners/locking them up; increases the chance of survival/allows reproduction/preventing the amount of death).
7. Paragraphing	3	Paragraphs are structured and ordered to pace and direct reader's attention and cumulatively build argument across text.

Table 7. (Continued)

<i>Criterion</i>	<i>Score</i>	<i>Annotations</i>
8. Sentence structure	4	A range of more sophisticated structures are used. Errors keep this from Category 5: verb error in line 3 (<u>being</u> kept), missing verb in last sentence of 1 st paragraph, and agreement error in 2 nd paragraph (all of their life)
9. Punctuation	4	Sentence level punctuation is correct. One missing? In first paragraph (two used successfully over the text), mostly successful use of commas for phrasing and in lists, use of underlining, and an apostrophe for plural possession (animals'). Strong Category 4.
10. Spelling	5	All simple and most common words correct. Although there are more than 15 difficult words correct, errors prevent Category 6.

DISCUSSION

The NAPLAN assessment of the student's text (Table 1) is detailed in Table 7. In the marking guide (ACARA, 2011), this text was awarded 43/48 points, with the author losing points for their vocabulary choices, sentence structure, punctuation, and spelling errors, yet they received perfect marks for criteria relating closely to the persuasive writing genre, namely their ability to orient the audience, the overall text structure, ideas, their use of persuasive devices, and text cohesion. In the marker's annotations regarding the Audience criterion, the writer's voice is described as strong, as they used persuasive devices to create an engaging opening that addressed the reader in emotive language, and appealed to readers' emotions, values and reasoning. This first criterion is arguably the most appropriate place within the NAPLAN marking framework for a discussion of how the author dealt with alternative arguments, or how they positioned and modelled an intended audience, yet no mention of such choices are made by the marker. Aside from Audience, the Persuasive Devices criterion could also be used to acknowledge dialogic choices, yet while the marker does specify the use of rhetorical questions and other devices, there is no discussion of the role played by these devices to acknowledge a range of dialogic perspectives. While the marker's analysis mentions that the author's chosen text structure and ideas enabled them to build a strong position, there is little emphasis given to their management of author and audience relations.

CONCLUSION

The NAPLAN focus on persuasive writing since 2011 has emphasised the need for Australian educators to build students' rhetorical capabilities across six years of primary and high school. The NAPLAN marking guide is made up of ten criteria,

each divided into a number of point categories, however for teachers working with this guide, the point category descriptions need to be unpacked to enable students to meet these standards. For educators hoping to uncover more about the linguistic choices made by young writers to position and/or persuade their audience, an ENGAGEMENT analysis represents one effective option, showing how writers align or disalign themselves with supporters or detractors, how they construct for their text an intended audience, and how they position their audience to approve or disapprove of particular viewpoints. The analysis presented in Table 1 highlights how one successful young writer deployed a broad range of dialogically engaged resources to accomplish numerous rhetorical functions. Their use of dialogic utterances – both expansive and contractive – demonstrates an understanding that the topic is at least somewhat controversial, and the author carefully ensured those with alternative viewpoints had their positions acknowledged before being guided to see the author’s argument as the most reasonable. The text also features seven monoglossic utterances; however, these were commonly tempered by dialogically engaged resources, masking the one-sided effect the bare assertions carry.

This chapter aimed to demonstrate the wide range of complex dialogic choices made by one young, anonymous writer in preparation for the 2011 NAPLAN test. While the age and year level of this writer remains unknown, the high score and dialogic choices suggest the text was likely to have been written by a Year 7 or 9 student. At the tertiary level, thanks to researchers such as Swain (2007, 2010) and Wu (2007), there are profiles of the sorts of ENGAGEMENT resources used by successful students to persuade others; however, similar profiles at the primary and secondary levels have yet to be developed. Research which compares the ENGAGEMENT resources deployed by successful writers across the NAPLAN years could be used to develop ENGAGEMENT profiles of successful young writers at each year level. Educators could then use these profiles to support struggling young writers to become more persuasive.

NOTES

- ¹ Within the SFL tradition, names of system networks (e.g., ENGAGEMENT), sub-categories (e.g., PROCLAIM), and resources (e.g., DENY) are presented in small capitals to avoid confusion with the regular use of these words.
- ² For this detail please refer to Martin & White, 2005.
- ³ See for example the work of Christie & Derewianka (2008) who broadly discuss the use of monoglossic and heteroglossic utterances as children develop, and Derewianka (2007) for a specific account of ENGAGEMENT use by three secondary students.

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