Submission

No 50

INQUIRY INTO CHILDREN AND YOUNG PEOPLE 9-14 YEARS IN NSW

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Submission

by the

Australian Council for Educational Research

to

The Parliamentary Joint Standing Committee on Children and Young People of the Parliament of NSW inquiry into children and young people from 9 to 14 years of age.

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Preface

The Australian Council for Educational Research (ACER) is pleased to respond to *The Parliamentary Joint Standing Committee on Children and Young People of the Parliament of NSW enquiry into children and young people from 9 to 14 years of age* request to make a submission.

This submission draws upon a diverse range of expertise within ACER to provide evidence to the enquiry. The theme, which aims to give coherence to this submission, is drawn from our mission statement: *improving learning*. Consequently this submission addresses the question of what can be done to improve the learning of 9 to 14 year olds in NSW. Improving learning is, we believe, one of the foundations to having a life that is well lived.

I wish to acknowledge the work of the ACER staff who contributed to each of the sections in this submission and to thank the Committee for extending an invitation to ACER to make this submission.

Professor Geoff Masters
CEO
Australian Council for Educational Research

Contents

Figures....ii

Tables....ii

Summary of ACER's submission....3

About ACER....4

The organisation of ACER's submission....4

Indigenous education....5

Quality teaching and student achievement....13

Student engagement in the middle years....19

Literacy....27

Influence of sport, television, computers and the internet on achievement in Mathematics....33

Thinking about a career....41

References....46

Figures

Figure 1 Attitudes to school, Year 9 in 1995 and 1998 cohorts 21

Figure 2 A simple mediation model of the relationships between students' attitudes, intentions and participation in further study 23

Figure 3 Percentage distribution of how much time students spend in various activities on a normal school day in NSW*(playing sport in bold)* 35

Figure 4 Year 8 mathematics achievement by amount of time spent playing sport in NSW 36

Figure 5 Year 8 mathematics achievement by amount of time spent watching TV or videos in NSW 37

Figure 6 Year 8 mathematics achievement by amount of time spent playing computer games in NSW 38

Figure 7 Year 8 mathematics achievement by amount of time spent using the Internet in NSW 39

Figure 8 Map of Australian occupations showing the socioeconomic status and the sex composition of 317 occupations in 2001 41

Figure 9 Graphical depiction of a map of occupations showing the zone of acceptable alternatives for a young child 42

Figure 10 Graphical depiction of a map of occupations showing the zone of acceptable alternatives of a 6- to 8-year-old male child 42

Figure 11 Graphical depiction of a cognitive map of occupations showing the zone of acceptable alternatives of a 9- to 13-year-old male child of average intelligence. *After Gottfredson, (1981, p. 557)* 43

Tables

Table 1 Percentage of NSW students at Years 3, 5 and 7 achieving the reading benchmark. 28

Table 2 Percentage of NSW students at Years 3, 5 and 7 achieving the writing benchmark. 28

Summary of ACER's submission

The key points in the ACER submission are that, in order to improve the learning of students in NSW:

1. for Indigenous students, there needs to be a strong commitment to improving the standards of living, their health and wellbeing, enhancing early childhood development, a recognition of intergenerational consequences and an understanding of how the life chances of nine- to fourteen-year-old Indigenous children will be decided by our actions.
2. there needs to be a clear focus on attracting, selecting, preparing, accrediting, developing and supporting quality teaching.
3. the connections between student attitudes, intentions and subsequent educational participation need to be understood. Attention to what happens in the middle years of school, including nurturing of favourable attitudes to school, can influence educational intentions and improve the learning of students through increasing subsequent participation in post-compulsory education.
4. there is a wide range of literacy learning needs amongst diverse groups of students that need to be addressed. The importance throughout these years of quality teaching, targeted to the identified needs of students, and supported by quality teacher professional learning, is paramount.
5. students need to participate in physical activity or sport to a moderate level while not being discouraged from sedentary past-times (providing these too are pursued in moderation). Students should be encouraged to maintain a balanced life style.
6. students should be provided with the opportunity to sample as widely as possible those opportunities available in the world of work that are most strongly related to their interests and ability. This will maximise the chances of them making sound educational and vocational choices.

About ACER

ACER's mission is to create and disseminate research-based knowledge and tools that can be used to improve learning. In pursuing this mission, ACER undertakes a wide range of research and development and provides services and materials in support of educational policy-making and improved professional practice.

ACER is an independent, not-for-profit national educational research organisation established in 1930. With offices in Melbourne, Sydney, Brisbane, Perth and two overseas locations, ACER is able to provide comprehensive services to the education community. Information about ACER is available on the ACER website: http://www.acer.edu.au

The organisation of ACER's submission

The focus of *The Parliamentary Joint Standing Committee on Children and Young People of the Parliament of NSW enquiry into children and young people from 9 to 14 years of age* is:

1. the needs of children in this age group
2. the impact of age, gender and disadvantage
3. activities, services and support required
4. the impact of changing workplace practices on this age group
5. any other relevant matters.

Each section of the submission by the Australian Council for Educational Research (ACER) reflects an area of expertise. To assist the Committee to digest the contents of this submission, each section has a title, the author's name and position at ACER and the focus or focuses of the paper. Each section concludes with a statement summarising the main points to help process the information.

It is intended to give coherence to this submission by focusing upon issues around improving learning for children in NSW aged 9 to 14. ACER contributors were requested to make their submissions evidence-based reflecting ACER's commitment to contributing to policy development and public debate in a scientifically rigorous way.

Indigenous education

Authors: Gina Milgate and Jenny Wilkinson

Focus: the needs of children in this age group

Gina Milgate is an Indigenous Researcher and Jenny Wilkinson is a Research Fellow.

Why are Indigenous students a priority?

On 13th February 2008, the Prime Minister of Australia addressed the nation about past and present wrongs with regard to Indigenous Australians. He highlighted the importance of education for Indigenous children and addressed in particular the needs of pre-school children: "Let us resolve to build new educational opportunities for these little ones, year by year, step by step, following the completion of their crucial pre-school year."

Many educational issues and problems in Australia cut across all communities. However, the educational outcomes for Indigenous children of all ages across the country are generally considered to be a national disgrace. The most disadvantaged group of nine- to fourteen-year-olds in the country is Indigenous students. We will therefore discuss educational issues that relate to this group in particular in New South Wales.

A first class education and high expectations for Indigenous children hold the key to their current and future wellbeing and life chances. The ability of Indigenous families to access this education for their children is closely connected to health, housing and environmental issues. We will address these general issues and their importance for educational opportunities and outcomes for nine- to fourteen-year-olds in NSW before addressing specific issues with regard to schooling.

A snapshot of the achievement levels of Indigenous students

National and international data indicate unacceptable levels of educational and other outcomes for Indigenous children. Some of the major sources of data include:

- Longitudinal Surveys of Australian Youth (LSAY) data indicates that most Year 9 Indigenous students have a positive view of themselves, their school and the aspiration to complete Year 12. However, Year 9 Indigenous students perform lower in literacy and numeracy than their non-Indigenous

counterparts and are less likely to complete Year 12 (Rothman, Frigo et al. 2005).

- Trends in Mathematics and Science Study (TIMSS) investigates the patterns of achievement in maths and science for students in Year 4 and Year 8. Findings from TIMSS 2003 found significant differences in the level of student achievement between Indigenous and non-Indigenous students. For example, Indigenous students scored 79 points lower in mathematics and 72 points lower in science than their non-Indigenous counterparts (Thomson, McKelvie & Murnane, 2006). Various factors from the study that correlated with these findings included the level of self-confidence in mathematics and science, how often English is spoken in the home, the number of books in the home and whether there was a computer and study desk in the home.

- Results for Indigenous students usually are about 20% lower than for non-Indigenous students in national benchmarks in literacy and numeracy. Particularly worrying is that this proportion worsens between Year 3 and Year 7 (MCYEETYA 2006, p.13). In May 2008, all Australian children will be given benchmark literacy and numeracy tests at Years 3, 5, 7 and 9, the 'middle years.'Additional information will then be available about the achievement levels of NSW and other Indigenous children at these levels.

- The Program for International Student Assessment (PISA) is the largest such assessment program in the world. It evaluates the scientific, mathematical and reading literacy of 400,000 fifteen-year-old students in 57 countries, including Australia. A comparison can be made between the performance of Indigenous and non-Indigenous students of this age. Clearly the preceding years of education and in particular the educational experiences of children from the age of nine to fourteen years will have an effect on student performance at fifteen. While the PISA 2006 results indicate that Australia is above the OECD average in all three testing categories, this is an overall picture and if not further investigated masks areas of serious inequity. As the national project manager for PISA in Australia points out:

> Australia's lowest performing students are most likely to come from Indigenous communities, geographically remote areas and poor socioeconomic backgrounds. About 40% of Indigenous students,

> 23% of students from the lowest category of socioeconomic status and 27% of students from remote schools are not meeting a proficiency level in science that the OECD deems necessary to participate fully in a 21st century workforce and society. Of course, these too are averages. There are schools catering to students from remote, Indigenous and low socioeconomic backgrounds that do perform well – and these examples provide the key to improvement across the entire education system. (Dr Sue Thomson, Education News, *The Age*, 4 February 2008)

- Longitudinal Study of Indigenous Children, *Footprints in Time*: This study will commence in April 2008 and will provide an evidence base to improve programs and policies for very young Indigenous children. The first two groups will be children aged 6 to 18 months and 3 ½ to 4 ½ years. The parents of these children will also be interviewed. The circumstances of over 2200 Indigenous children across Australia will be tracked over at least four years. This study is a major part of the Australian Government's Indigenous Early Childhood package. The aim of this project, which was designed in consultation with a range of Indigenous stakeholders, is to close the gap between Indigenous and non-Indigenous Australians.

Indigenous education strategies

Indigenous educational outcomes are a priority and the implementation of the following strategies will help to prioritise and move forward this critical agenda.

NSW Aboriginal Education and Training Strategy 2006–2008

The NSW Aboriginal Education and Training Strategy 2006–2008 clearly states that: "By 2012, Aboriginal student outcomes will match or better outcomes of the broader student population", with its implementations core focus being on Quality Learning. The strategy highlights that Aboriginal Education and Training is Everyone's Business, the importance of Strong Cultures and Strong Communities, Making a Difference where it Counts, Quality Teaching and Leading and Walking Together.

Australian Directions in Indigenous Education 2005–2008 MCEETYA

The Australian Directions in Indigenous Education 2005–2008 document clearly identifies five areas that are critical for engagement of Indigenous children and young people in learning. These areas include early childhood education, school and community educational partnerships, school leadership, quality teaching, and

pathways to training, employment and further education (MCYEETYA 2006). It is critical for these areas to be addressed to ensure that Indigenous students receive the best start to their education to prepare them for a smooth transition through their schooling and to increase their retention at vital points in their education.

Two Ways Together

Two Ways Together is the NSW Aboriginal Affairs plan for 2003–2012. The plan incorporates both indicators from Overcoming Indigenous Disadvantage (OID) and NSW specific measures. This program will provide practical initiatives to redress educational and other disadvantage for Indigenous children by, for instance, providing 2000 children with assistance in primary school and testing over 65,000 for middle ear infections. Other NSW programs are the *NSW Interagency Plan to Tackle Child Sexual Assault in Aboriginal* Communities *2006–2011*, the *Schools Partnership Program* and the *NSW Aboriginal Justice Plan.*

Factors influencing the educational outcomes of Indigenous students

Health

Lowered life expectancy and major health problems are confronting many Indigenous Australians. Non-Indigenous Australians can expect to live over seventeen years longer than Indigenous Australians.

In 2007 the Australian Bureau of Statistics (ABS) published life expectancy estimates for children aged between six and eleven years. For Indigenous male children born between 1996 and 2001 estimated life expectancy is 59.4 years and for Indigenous female children born in the same period 64.8 years. For the total population in this age group the estimates are 76.6 years for male children and 82.0 years for female children. Thus Indigenous children currently aged between seven and twelve years have a life expectancy that is 17.2 years less than that of non-Indigenous children (Steering Committee for the Review of Government Service Provision 2007). As with other Indigenous Australians, the life expectancy of children between the ages of nine and fourteen years is an indication of their current and future health and wellbeing.

Some of the major health issues that are prevalent in many Indigenous communities include hearing impediments (otitis media), substance abuse and child abuse. Hearing impairment in Indigenous children is widespread across Australia in Indigenous communities. As an example, at Cherbourg State School (Queensland) all children

were screened for hearing loss in 1999. All but three of the children in the school had mild to moderate hearing loss in one or both ears.

The Environment

Living conditions for many children in Indigenous communities impact on their ability to learn and to reach their full potential. Environmental health conditions such as overcrowding in houses can have an impact on children's health, wellbeing and educational outcomes. Reducing overcrowding can contribute to improvements in health, school attendance and performance, substance abuse, and family and community violence (Steering Committee for the Review of Government Service Provision 2007). Furthermore this has a flow on effect and impact on school retention and employment outcomes. Early childhood development and school engagement are major influences on Indigenous students. Absenteeism is a widespread problem in Indigenous communities, as is low retention to Year 12 of schooling. Absenteeism needs to be addressed both at school and community level. Lack of appropriate preparation for secondary schooling is a major factor impacting on retention to Year 12, and one that needs to be urgently addressed in the crucial nine to fourteen year old age group .

Educational Leadership

Educational leadership is crucial in improving opportunities and outcomes for Indigenous children. Appropriate leadership includes a refusal to accept absenteeism and early leaving as the norm, establishing within a school a culture of high expectations for Indigenous children, and demanding that the school curriculum adequately prepare children for secondary schooling. Most of this 'groundwork' occurs in the earlier part of the nine to fourteen year timeframe, with primary education being of crucial importance. Children who enrol in secondary school with levels of achievement in many cases years below their age level cannot be expected to thrive and to survive in secondary schools.

Indigenous principals, teachers and teacher assistants are very important for Indigenous children. Increasing the number of Indigenous role models needs to be a major target in improving outcomes. Role models play an important role in people's lives, especially young people who look up to them as inspiring characters in their field. For Indigenous children, role models can hold a significant place in their lives

as they provide an example of achievement, persistence and courage. Indigenous children love hearing stories about people who have grown up in their communities and have reached their goals, providing children with the motivation to believe in themselves and achieve their dreams.

Programs working for Indigenous education

Whilst research indicates that Indigenous students are performing below their non-Indigenous counterparts it is important to acknowledge and showcase the educational programs that have been implemented that are continuing to make a difference for Indigenous students.

Dare to Lead

The 'Dare to Lead' project (www.daretolead.edu.au) is funded by the Australian Government and managed by the Australian Principals Associations Professional Development Council. The goal of the project is to improve data-evidenced outcomes for Indigenous children. Specific percentage targets are set in this regard.

Over 5000 schools are members of the Dare to Lead coalition, including almost 2000 (Dare to Lead, 2008) in New South Wales. The site provides extensive data and many examples of successful initiatives. It includes a What Works Program addressing cores issues such as Reducing Suspensions, Literacy for Success at School, Numeracy and Engagement. The site also allows for the sharing of successful initiatives and case studies across Australia.

Stronger, Smarter Principals Leadership Program

The Stronger, Smarter Principals Leadership Program is directed towards leaders in Indigenous education across Australia. This program began operation at the Indigenous Education Leadership Institute in 2007. It draws on the successful leadership of Cherbourg State School in Queensland, leading to significant clear and convincing data-based improvement in outcomes for Indigenous children. A major thrust of the program is the demand for high expectations from teachers and school leaders.

Other relevant areas to consider are the staffing of schools with Indigenous children, the influence of school location on educational opportunities and the accessibility of services for Indigenous children with special educational needs, including the

identification of and appropriate provision for gifted Indigenous children. The number of Indigenous students in NSW selective high schools is relevant here, as is the tracing of their educational progress in these schools. Investigation is needed into whether this is always the appropriate pathway for gifted Indigenous students, and whether a separate pathway would be more beneficial for these students.

What needs to be done for Indigenous students?

To improve the educational outcomes for Indigenous students, the following areas need to be addressed:

- the standard of living of Indigenous children and young people
- the health and wellbeing of Indigenous children and young people
- early childhood development of Indigenous children
- inter-generational effects of parental income, employment and education levels
- the importance and recognition of Indigenous role models and leaders.

All of these factors have a major effect on middle year Indigenous students within the 9 to 14 year old age bracket.

Conclusion: gaps between need and provision

There are currently major gaps between the educational and other needs of middle years (nine to fourteen year old) Indigenous children in NSW, as in other states and territories. As stated at the beginning of this section, many of these needs and gaps apply to other nine- to fourteen-year-olds, and some findings may be generally relevant. In looking in particular at Indigenous children in this age group, we are looking at those most in need as a group and in light of how as a group they can currently expect to die on average seventeen years before other Australians in the same age group. As Dr Thomson notes, the examples of schools that do produce students who perform well are the key to improvement for all students. This applies vey strongly to the education of our Indigenous students (Thomson 2008).

The evidence we have presented indicates that to improve the learning of Indigenous children in NSW, there needs to be a strong commitment to improving their standards of living, their health and wellbeing, enhancing early childhood development, a

recognition of intergenerational consequences and an understanding of how the life chances of nine- to fourteen-year-old Indigenous children will be decided by our actions.

Quality teaching and student achievement

Author: Professor Stephen Dinham

Focus: activities, services and support required

Professor Dinham is Research Director of the Teaching, Learning and Leadership program.

Why Teacher Quality is Important

Until the 1960s it was believed that schools and teachers made little difference to student achievement, which was largely determined by heredity, family background and socioeconomic context (Reynolds, Teddlie, Creemers, Sheerens & Townsend, 2000, 3–4; Dinham, 2007b, 263–264).

After decades of research, there is now considerable evidence that the major in-school influence on student achievement is the quality of the classroom teacher (Rowe, 2003; Hattie, 2003, 2007; Mulford, 2006; OECD, 1994, 2005). More can be done to improve student achievement through improving the quality of teaching than by the increase or improvement of any other factor (Sanders & Horn, 1998).

The classroom teacher's influence on student achievement

Hattie and his colleagues conducted a meta-analysis of more than 500,000 studies and found that the student accounts for about 50% of the variance in educational achievement. Homes can account for 5 to 10%, schools 5 to 10%, and peers 5 to 10%. Teachers, however account for about 30% of the variance in student achievement (Hattie, 2003, pp. 1–2). As a result, there has been a major focus on pedagogy, quality teaching and teacher performance from the late 1980s to the present.

How and why teacher quality varies

The research evidence is also clear on a related matter: teacher quality varies considerably, with the differences within schools often greater than the differences between schools and systems when it comes to measuring student achievement (Rowe, 2003).

Recruiting, preparing, accrediting, supporting, professionally developing and retaining quality teachers all assume great importance in efforts to improve the quality of teaching and learning in schools:

> "Ten years ago, seminal research based on data from Tennessee showed that if two average eight-year-old students were given different teachers – one of them a high performer, the other a low performer – their performance diverge by more than 50 percentile points within three years … By way of comparison, the evidence shows that reducing class sizes from 23 to 15 students improves the performance of an average student by eight percentile points at best. Another study, this time in Dallas, shows that the performance gap between students assigned three effective teachers in a row, and those assigned three ineffective teachers in a row, was 49 percentile points. In Boston, students placed with top-performing math teachers made substantial gains, while students placed with the worst teachers regressed — their math got worse" (McKinsey & Co., 2007: 12).

The influence of leadership

Research has also demonstrated the importance of contextual factors, particularly educational leadership, on teacher quality (Dinham, 2007a). School leaders play major roles in creating the conditions in which teachers can teach effectively and students can learn, although the influence of leadership on student achievement is often under-estimated (Dinham, 2007b, 264–265). School leaders also play major roles in facilitating teachers' professional learning, another key influence on the quality of teaching and student accomplishment.

What quality teaching looks like

There is strong consensus on what quality teaching looks like, although teachers' work is highly complex and is carried out across a variety of contexts (OECD, 2005, 99; Rice, 2003). Research from the NSW Minister for Education and Training and Australian College of Educators Quality Teaching Awards found that exemplary teachers from early childhood through to university levels possessed and manifested the following attributes (Dinham, 2002):

- A high level of knowledge, imagination, passion, and belief in and for their field.
- An overriding commitment to, and high aspirations for, moving ahead the learning of their individual students.
- A rich repertoire of skills, methods and approaches, built up over years of experience, on which they are able to draw to provide the right 'mix' for the specific needs of individual students.

- A detailed understanding of the context in which they are working; of the specific expectations of the community; and of the needs of the cohort of students for whom they are responsible.
- A capacity to respond to the student cohort, individually and collectively, and to the context, through their teaching practice.
- A refusal to let anything get in the way of their own or their students' learning, and what they perceive as needing to be addressed.
- A high level of respect and even affection from their students and colleagues, a by-product of their hard work and professionalism.
- A great capacity for engagement in professional learning through self-initiated involvement in various combinations of professional development activities, some provided by the employing authority; others sought out by the individual.
- A great capacity to contribute to the professional learning of others, and a willingness to do so.
- Moral leadership and professionalism, in that they exemplify high values and qualities and seek to encourage these in others.

However, it is *how* these broad attributes are dynamically and professionally combined that is the hallmark of the expert teacher (OECD, 2005; Hattie, 2003; Berliner, 2004; Ayres, Dinham & Sawyer, 2004). Thus, the major difficulty lies not so much in identifying and describing quality teaching, but in developing these capacities in more teachers and schools (OECD, 2005; Darling-Hammond & Baratz-Snowden, 2005).

Some of the factors hindering quality teaching and what needs to be done

There are a complex interplay of factors influencing and hindering quality teaching, including:

- Teacher shortages work against higher quality candidates; quality of those entering teaching; declining demand for teacher education courses recently.

- Ineffective procedures to select those entering teaching courses, typically utilising final secondary university entry scores or undergraduate record, which do not assess suitability for teaching.
- Archaic, lock-step salary structures that see teachers' salaries plateau at a time when salaries in other professions are rising steeply.
- Pay systems that do not encourage or reward professional learning and skills.
- A tendency to appoint the least experienced teachers to the most challenging schools; unequal and inequitable distribution of teacher expertise.
- Low expectations for students and groups held by some teachers, school and society.
- Lack of national common standards and procedures for accrediting and judging the effectiveness of teacher education courses and teachers (beginning, competent, more accomplished); variation in standards and operation of teacher registration authorities.
- Inadequate links between teacher education institutions and practitioners; the gap between 'theory' and 'practice'.
- Varying induction and support for beginning teachers.
- Systemic barriers to free movement and employment of teachers across Australia.
- A damaging belief that good teachers are 'born' and not 'made'; the apparent simplicity of teaching – everyone has been to school, anyone can teach.
- The isolation of the classroom – lack of opportunity to observe and be observed; for teachers to learn from each other; lack of structured feedback on performance using a standards-based framework and a language to analyse and discuss teaching practice.
- Lack of agreement over how students and teachers learn.
- Variable quality of educational leadership in schools; need for people who have high-level expertise in teaching and learning and who can lead change.

- Difficulties in identifying, assisting and where necessary removing ineffective teachers.
- Problem of linking teaching and learning initiatives to measurable improvements in educational outcomes; fragmented initiatives.
- Problem of up-scaling successful educational practice.
- Educational research that doesn't impact in the classroom.

The OECD noted in its 2005 report *Teachers Matter* the need to develop and implement policy to address persistent and universal concerns about the quality of teaching: the attractiveness of teaching as a career; developing teachers' knowledge and skills; recruiting, selecting and employing teachers; and retaining effective teachers in schools.

McKinsey & Company in its review of 'the world's best performing school systems' found that these systems 'consistently do three things well' (2007, 13):

1. They get the right people to become teachers (the quality of education system cannot exceed the quality of its teachers).
2. They develop these people into effective instructors (the only way to improve outcomes is to improve instruction).
3. They put in place systems and targeted support to ensure that every child is able to benefit from excellent instruction (the only way for the system to reach the highest performance is to raise the standard of every student).

Conclusion

The evidence presented indicates that to improve the learning of children in NSW there needs to be a clear focus on attracting, selecting, preparing, accrediting, developing and supporting quality teaching. Every student deserves teachers who are suited to teaching, well-trained and qualified, highly skilled, caring, and committed to moving forward the learning of their students.

Student engagement in the middle years

Author: Kylie Hillman

Focus: the needs of children in this age group

Kylie Hillman is a Research Fellow in the Teaching, Learning and Leadership Research Program.

Key points

In order to enhance student engagement and improve learning across the middle years and particularly at transition points between primary and secondary schooling, New South Wales students need:

- A positive school climate, one in which other students are seen as applying themselves to learning and enjoy being there
- High quality teachers, who can encourage and challenge students to find and pursue matters that interest them
- Effective discipline and a safe and secure school environment
- Opportunities to apply their learning to the outside world, including the world of work
- Access to a range of extra- or co-curricular activities that provide opportunities for students to work together towards a common goal, to develop their social skills and enhance their sense of being a member of a community
- Continuity of all of the above as they transition from primary to secondary school.

Why is student engagement important?

Student engagement can be viewed both as an important outcome of schooling and as a potential influence on academic outcomes of schooling, such as student performance in achievement tests and pursuit of further study. This submission focuses on the latter, and how student engagement might be influenced to increase student performance and progression through secondary school. Finn (1989) argued that alienation or feelings of estrangement contribute to the likelihood that a student will leave before Year 12. According to Finn's 'participation-identification' model,

disengagement in the early secondary years has a long-term effect on identification with school, as well as on behaviour and achievement in the later years. A number of research studies have linked poor school performance to declining motivation to learn, disengagement from school and early leaving (Astone & McLanahan, 1991; Kaplan et al, 1997).

Research into student engagement distinguishes between behavioural engagement (participation in school-related and extra-curricula activities), emotional engagement (identification with and attitudes to school) and cognitive engagement (intrinsic or self-motivated learning) (Fredericks, Blumenfeld & Paris, 2004). This submission presents evidence on the relationships between students' emotional and behavioural engagement – in the form of their attitudes to school, intentions to continue study and participation in extra-curricular activities – their performance in academic activities and their participation in post-compulsory education. This information is drawn from two major studies, the Trends in Mathematics and Science Study (TIMSS), in which nationally representative samples of Year 4 and Year 8 students are tested on mathematics and science understanding and surveyed as to their school experiences, and the Longitudinal Surveys of Australian Youth (LSAY).[1]

Engagement and Achievement

Attitudes to school in the LSAY program are based on student responses to a set of 30 items (see Box 1 for details). The five domains of attitudes to school include students' general satisfaction with school, their interest or intrinsic motivation, their attitudes to their teachers, their views on the opportunities that school provides, and their sense of achievement. In both LSAY cohorts, students agree more readily to questions about their sense of achievement (I always achieve a satisfactory standard in my work) and opportunities for success (The work I do is good preparation for the future) than they do to items such as "Teachers listen to what I say" or "I enjoy what I do in class". Around 50% of students in Year 9 agreed to items on the Interest/Motivation scale and 60% to items on the General Satisfaction scale, compared over 80% on the Opportunity and Achievement items, an indication that personal interest in subject matter and intrinsic motivation (pursuing something for interests' sake) and general enjoyment of schooling may already be on the wane at this stage of schooling.

[1] Members of the 1998 and 1995 Year 9 cohorts of LSAY were between 14 and 15 years of age when first surveyed (the majority were 14).

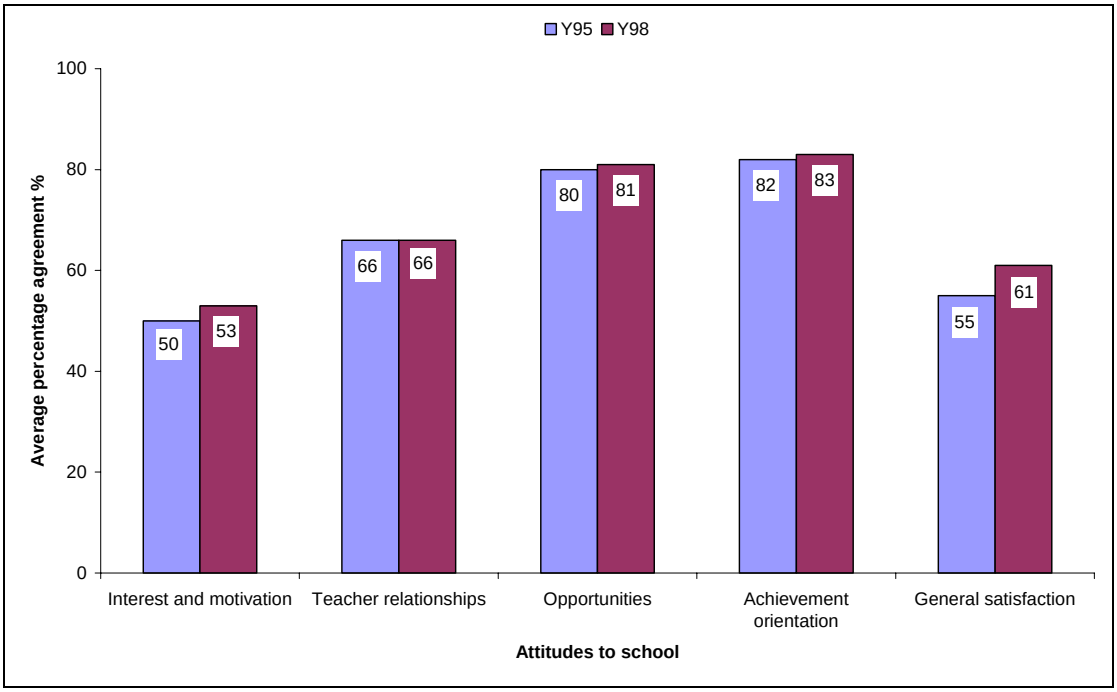

Figure 1 Attitudes to school, Year 9 in 1995 and 1998 cohorts

An examination of student-level differences in attitudes in the 1995 cohort found that:

- Female students showed higher levels of general satisfaction with school life, were more positive about their teachers and were more satisfied with their achievement at school
- Students from non-English speaking backgrounds showed higher levels of satisfaction with school on all dimensions
- Indigenous students showed no difference compared to other students on the General Satisfaction, Teacher and Opportunity scales but were less satisfied with their achievement at school
- Students with higher scores on General Satisfaction and Achievement scales in Year 9 also reported higher self-assessed achievement in Year 10 (Marks, 1998).

The possible relationship between students' attitudes towards various aspects of their school experiences and their achievement in the middle years has also been examined in international studies. TIMSS 2003 found that the degree to which students in both Year 4 and Year 8 enjoyed mathematics and science was positively related to their achievement levels. Almost 80 per cent of Year 4 students agreed to some extent that

they enjoyed learning mathematics, and 87 per cent that they enjoyed learning science; however, this proportion declined with advancing school years to 57 per cent of students enjoying mathematics and 67 per cent enjoying science at Year 8 level. TIMSS also asked Year 8 students a series of questions aimed at evaluating students' valuing of both mathematics and science. The index formed from these questions showed that valuing mathematics was positively related to achievement—the higher the achievement levels, the higher the value placed on the subject by the student.

Engagement, intentions and participation

Behavioural engagement has been investigated in the LSAY program by measuring students' reported levels of participation in a number of extra-curricular activities that are commonly offered by Australian secondary schools, including: sport; music, band or orchestra; debating; drama, theatre, dance or school plays; and community and support work at school. It has been argued that with such participation comes identification with school, a 'belonging' that can help to promote a feeling of self-worth and assist students to become resilient learners, particularly if they are part of a group at risk of leaving school before completing Year 12. Findings from an investigation of the behavioural engagement of LSAY students include:

- Females had higher engagement levels than males. This was apparent in government, Catholic and Independent schools, and at all achievement levels
- Students from higher socioeconomic backgrounds and those with professional parents had the highest levels of engagement with school
- Students who intended to enrol in tertiary study had higher engagement levels than those who planned to leave school and go to work (Fullarton, 2002).

Relationships were also found between levels of behavioural engagement, attitudes to school, and achievement in Year 9. High scores on the Interest/Motivation and General Satisfaction domains of school attitudes were positively correlated with behavioural engagement, such that students who were generally happy with school and with learning (as measured by the General Satisfaction scale) or who were intrinsically motivated were participating in more activities than those who were not.

Further investigation of the relationships between student engagement, intentions to remain at school and pursue further education and actual participation in the post-

compulsory years has found that students' attitudes influence their participation in Year 12 and higher education indirectly, through the development of an intention to continue their education that then influences their actual behaviour (see Figure 2).

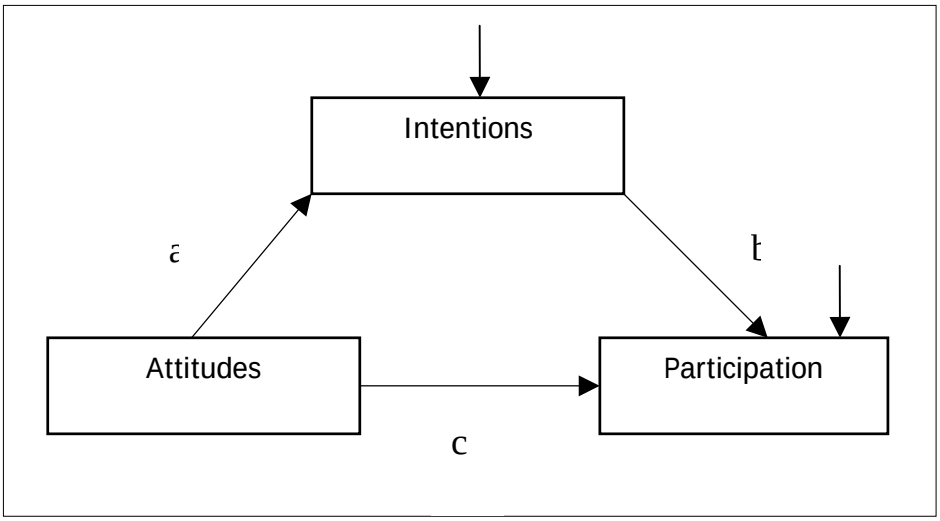

Figure 2 A simple mediation model of the relationships between students' attitudes, intentions and participation in further study

The results of analyses that compared the statistical strength of each pathway indicated that:

- Students' attitudes to school in Year 9 significantly predicted their intentions to participate in Year 12 (path a in Figure 2)
- Intentions to participate in Year 12, in turn, significantly predicted students' actual participation in Year 12 (path b in Figure 2)
- The direct effect of attitudes to school on actual Year 12 participation was not statistically significant (path c in Figure 2)
- The indirect, or mediated, effect (path a-b in Figure 2) was significant and accounts for over 95% of the total effects (Khoo & Ainley, 2005).

In other words, among members of the 1995 Year 9 LSAY cohort, those who had positive attitudes to school when they were in Year 9 were more likely to intend to continue at school to Year 12, and those who intended to remain at school were more likely to complete Year 12. Furthermore, students' attitudes to school were only weakly associated with their background characteristics and previous achievement, as has been found in a number of other studies (see Ainley & Bourke, 1992).

This suggests that the formation of positive attitudes to school can provide a vehicle for influencing educational intentions and subsequent participation through to the final year of school. It also suggests that low-achieving students can still have the capacity to find school an enjoyable and rewarding experience, and thus experience some positive social and emotional outcomes of schooling.

The effects of students' attitudes to school on their intention to participate in higher education (university) and actual participation followed the same pattern as those for intention to participate and actual participation in Year 12. That is, students' attitudes to school significantly predicted their intention to participate in higher education, and these intentions towards higher education, in turn, significantly predicted their actual participation in higher education. Attitudes did not have a significant direct effect on participation in higher education, which indicated that almost all of the influence of students' attitudes to school on participation in higher education was mediated by their intentions to participate.

In summary, the results of the analyses of these longitudinal data support the theory that students' intentions for continuing with education, as expressed when they were in junior secondary school, were important indications of actually continuing in education. A range of factors, including attitudes to school, influenced those intentions. The importance of developing positive attitudes to school amongst students was highlighted by the finding that attitudes to school were in fact more strongly related to educational intentions than any aspects of student background included in the analysis, including socioeconomic background. Encouraging and developing positive attitudes towards school may be a way in which historical under-representation of particular social groups in higher education can be ameliorated.

Improving student engagement

The middle years of schooling includes a number of transitions for students; points in their educational pathway that can be of critical importance to their later choices and options for further education and employment. Student engagement is of key importance during these transitions, for it is during these times that students may be at greater risk of disengaging with school and leaving before completing, a choice that places many at risk for later experience of unemployment and underemployment (see McMillan & Marks, 2003).

Student attitudes can be regarded as malleable influences on participation, because they are in part formed in response to curriculum, teaching practices and organisational arrangements. According to Fredericks and colleagues, the path to student engagement may be "social or academic and may stem from opportunities in the school or classroom for participation, interpersonal relationships, and intellectual endeavours" (Fredericks et al, 2004, p.61). Increased participation in post-compulsory education by young people will be supported by attending to those aspects of earlier school experiences and developing policies that acknowledge and make use of the influence of such factors as attitudes, engagement and intentions on educational achievement and participation.

Conclusion

The evidence presented indicates that to improve the learning of children in NSW it is important to understand the connections between student attitudes, intentions and subsequent educational participation. If those connections are strong, as suggested in the results of the reports summarised here, it can be inferred that policy changes and actions intended to increase participation in post-compulsory education need to include attention to what happens in the formative school years, to how students feel about their school's environment and how their plans for further study develop over these years.

The research summarised here has shown that, other things being equal, students who are positively oriented to their schools and are actively engaged in its academic work and other extra-curricula activities are more likely to develop an intention to continue through school and beyond, and then go on to fulfil that intention. Many of the aspects of students' backgrounds that are generally accepted as having a relationship with participation in Year 12 and education beyond school also operate by influencing students' intentions, which later become manifest as their participation in educational activities. Perhaps more importantly, the results also show that positive attitudes to school are relatively independent of both student background characteristics and their proficiency in literacy and numeracy. In other words, attention to what happens in the middle years of school, including nurturing of favourable attitudes to school, can influence educational intentions and improve the learning of students in NSW through increasing subsequent participation in post-compulsory education.

Box 1: Attitudes towards secondary school in LSAY

Young people in the LSAY program respond to the following items about their school experiences in the first few years of interviews:

My school is a place where…

- The work we do is interesting
- Teachers are fair and just
- The things I learn are important to me
- I have learnt to work hard
- I feel happy
- Teachers listen to what I say
- I achieve a standard in my work I consider satisfactory
- I like learning
- I get enjoyment from being there
- The work I do is good preparation for the future
- I like to ask questions in class
- Teachers give me the marks I deserve
- I have acquired skills that will be of use to me when I leave school
- I always achieve a satisfactory standard in my work
- I like to do extra work
- Teachers take a personal interest in helping me with my school work
- I really like to go each day
- I enjoy what I do in class
- I always try to do my best
- Things I learn will help me in adult life
- I know how to cope with the work
- The teachers help me to do my best
- I get excited about the work we do
- I find that learning is a lot of fun
- I am given the chance to do work that really interests me
- I know I can do well enough to be successful
- The things I am taught are worthwhile learning
- I feel safe and secure
- Teachers treat me fairly in class
- I am a success as a student

Literacy

Author: Marion Meiers

Focus: the needs of children in this age group

Marion Meiers is a Senior Research Fellow in the Teaching, Learning and Leadership research program

The centrality of literacy in learning and the importance of strong literacy skills for effective participation in contemporary Australian society are well understood by all stakeholders in education, and strongly supported by research. The capacity to comprehend and compose a wide range of print and non-print texts is integral to learning in all curriculum areas, at all stages of schooling. The definition of reading literacy in the OECD Programme for International Student Assessment (PISA) highlights the importance of literacy skills:

> … understanding, using and reflecting on written texts, in order to achieve one's goals, to develop one's knowledge and to participate in society. (OECD, 2006)

Literacy continues to be a significant focus of strategic initiatives and resourcing within educational jurisdictions in all Australian states and territories. Literacy is also a major focus of programs and resources supporting the professional learning of teachers, in recognition that the professional knowledge and skills of teachers are crucial to successful student learning.

The terms of reference for the Inquiry include specific reference to *the extent to which the needs of children and young people vary according to age, gender and level of disadvantage*. In the area of literacy learning, there is clear evidence about the wide range of needs, and of the consequent variety of strategies and programs required to meet these diverse needs.

Evidence of the extent to which literacy learning needs in the middle years vary is available from several key sources.

Growth in literacy over time

An ACER longitudinal study followed the growth in literacy of a national sample of Australian children through the years of primary education (Meiers et al, 2006). A key

finding from this study was that while there was a clear pattern of growth in literacy achievement across the years of schooling, there was a considerable range of achievement across the whole cohort of students on each assessment occasion, from the first year at school and in subsequent years.

National benchmarks

Evidence from national and international studies indicates that students in NSW achieve relatively well in literacy in comparison with other states and territories but the results of these studies also identify specific areas of need.

At Years 3, 5 and 7, the reporting of the proportion of NSW students who achieved the 2006 national benchmarks in reading (Table 1) and writing (Table 2) is indicative of the needs of diverse groups of students.

Table 1 Percentage of NSW students at Years 3, 5 and 7 achieving the reading benchmark.

	All students	Male students	Female students	Indigenous students	LBOTE students
Year 3	93.1+/- 1.7	91.2+/- 2.2	95.2+/- 1.2	81.6+/- 4.3	93.0+/- 1.7
Year 5	90.3+/- 1.1	87.9+/- 1.3	92.8+/- 1.0	73.6+/- 3.0	89.4+/- 1.3
Year 7	88.4+/- 0.9	86.0.+/- 1.0	90.9+/- 0.8	68.4.+/- 2.4	85.7+/- 1.2

(from MCEETYA, 2006)
Note: The achievement percentages reported in these tables include 95% confidence intervals; for example, 80%+/-2.7, which means that there is a 95% chance that a true percentage lies between 77.3% and 82.7%.

Table 2 Percentage of NSW students at Years 3, 5 and 7 achieving the writing benchmark.

	All students	Male students	Female students	Indigenous students	LBOTE students
Year 3	93.8+/- 1.9	92.0+/- 2.4	95.6+/- 1.4	80.8+/- 5.0	93.5+/- 1.9
Year 5	93.9+/- 2.0	92.1+/- 2.5	95.8+/- 1.4	80.7+/- 5.8	93.3+/- 2.0
Year 7	93.0+/- 2.1	90.4 +/-2.8	95.7+/- 1.4	77.5.+/- 5.4	92.0+/- 2.4

A number of interesting differences can be seen from these data:

- the percentage of Indigenous students achieving the benchmark is lower than for all students and other groups for reading and writing at Years 3, 5 and 7

- the achievement of male students in reading and writing is slightly lower than the achievement of female students at each year level
- the percentage of Year 7 students achieving the Year 7 benchmark for reading is lower than the percentages of students at Years 3 and 5 achieving the reading benchmark.

These data identify groups of students at risk of falling behind their peers. Gender is one factor, Indigenous status another, and there is also evidence of different levels of achievement at different years levels, notably at Year 7, the first year of secondary school. The data includes results for students from language backgrounds other than English (LBOTE), and it is widely understood that these students have particular needs at different stages in their acquisition of English language skills.

International studies

The results of the 2006 PISA study (Thompson & De Bortoli, 2008) show that in reading literacy, 15-year-old students in NSW achieved a mean score that was significantly higher than the OECD average. Students in the ACT achieved the highest mean score of 535 points, and the mean score for students in Western Australia was 524 points. The mean score for NSW students was 519 points, which was higher than the other five Australian states. NSW students performed strongly at the higher levels on the reading literacy proficiency scale, around 40 per cent of students achieving level 4 or 5.

However, NSW showed the largest difference of all states in the proportion of low-achieving male and female students, with 19 per cent of males and six per cent of females not achieving level 2. This suggests that a significant proportion of middle years students, particularly males, need support in literacy learning.

The national PISA results show a large disparity between the mean reading literacy performance of Indigenous and non-Indigenous students. Further:

> As in PISA 2000 and PISA 2003, Indigenous students were again over-represented in the lower proficiency levels for reading literacy and under-represented in the upper proficiency levels. (Thomson & De Bortoli, 2007, p 169)

PISA 2006 also provided evidence about the relative performance of students in different geographic locations: *students who attended school in metropolitan locations*

performed about 20 score points higher than students from schools in provincial areas and about 50 score points higher than students attending schools in remote locations. The results of PISA 2006 indicate that reading literacy scores varied positively with students' socioeconomic background. These results have clear equity implications for school systems.

PISA enables the monitoring of reading literacy performance over time, and an important result in PISA 2006 was that: *From PISA 2003 to PISA 2006, there was a decrease in reading literacy performance by 13 score points for Australia overall. The difference in mean reading literacy scores decreased in all states between PISA 2003 and PISA 2006*. Of particular interest is the finding that the best performers in reading literacy did not perform as well in PISA 2006 as they did in PISA 2000 and PISA 2003 *(*Thomson & De Bortoli, 2007, p 176*).*

In summary, these results suggest that all students, including high-achieving students, continue to need ongoing support and focused literacy teaching throughout the middle years. This clearly implies that teachers need an extensive repertoire of strategies to address a wide range of needs, and this in turn requires ongoing, high-quality professional learning for all teachers.

Information communication technologies

The increasing use of Information Communication Technologies (ICTs) in everyday and school contexts means that students who are not proficient users of ICTs may be limited in the extent to which they can fully participate in economic and social life. In the case of literacy, ICTs have created new literacy demands on all students.

The 2005 Australian national assessment program assessment of ICT literacy in a nationally representative sample of students in Years 6 and 10 indicated that *students use ICT in a relatively limited way … Communication with peers and using the Internet are frequent applications but there is much less frequent use of applications that involve creating, analysing for transferring information* (MCEETYA, 2007).

More specifically, the impact of ICTs on literacy has been the subject of a considerable body of research in recent years. For example, a series of systematic reviews of the impact of ICTs on different aspects of literacy for 5–16 year-olds have been carried out by the Evidence for Policy and Practice Information and Co-ordinating Centre at the University of London since 2002. Systematic reviews aim to

find as much as possible of the research relevant to the particular research questions, and use explicit methods to identify what can reliably be said on the basis of these studies. These reviews have found only limited evidence of the impact of ICTs on the aspects of literacy investigated, such as the effectiveness of different ICTs in the teaching and learning of English (written composition) (Andrews et al, 2005).

Nevertheless, there is a compelling need to address the literacy demands created by new technologies. Freebody (2007) argues that:

> The increased use of online resources in schools is rapidly making irrelevant questions about whether or not 'critical literacy education' is necessary or a frill, or suited only to older or more academically advanced students. Online critical literacy is a basic skill when the learner is online. (Freebody, 2007, p 53)

Maintaining the gains of intervention

The research evidence indicates the diversity of needs related to effective literacy learning within the middle years, for all students, and for students from different backgrounds, different contexts, and for students with varying levels of literacy skills who achieve differently in literacy assessments.

In the last 20 years, considerable effort and resources have been allocated to intervention programs designed to meet the needs of different groups of students. However, for many students, interventions and additional support may need to be continuous throughout their schooling.

In a major review of literacy education, Peter Freebody (2007) draws on the work of Heckman who has studied the development of human skills and the impact of those skills on economics. Freebody focused on six lessons Heckman drew from the human capital research on skills formation. Two of these lessons are particularly relevant to this Parliamentary Inquiry: *the later the intervention, the less effective;* and the dissipation of gains by discontinuing support:

> Discontinued supports dissipate early gains. Heckman reports meta-analyses that show dramatic immediate gains following early interventions in reading, writing, numeracy and social skills. These analyses also indicate, however, that strong continuing support is necessary if these gains are to be maintained, in particular when the programs involve young students not achieving well in conventional schooling settings. Heckman referred to literacy, numeracy and social adaptability skills as 'self-productive skills', that is, in his

> terms, they are ‘skills that beget skills’, capabilities that direct and enrich knowledge growth and cognitive development. (Freebody, 2007, p. 61)

There appears to be a need to expand ongoing intervention strategies designed to meet the diverse needs of middle years students. Ways of maintaining intervention and support throughout the middle years need to be developed and introduced in all schools.

Conclusion

The evidence presented indicates that, in relation to literacy for students in the middle years, to improve the learning of children in NSW, quality teaching targeted to the identified needs of students and supported by quality teacher professional learning is paramount.

Influence of sport, television, computers and the internet on achievement in Mathematics

Author: Catherine Underwood

Focus: The needs of children in this age group

Catherine Underwood is a Research Officer.

Based on data from a sample of 769 Year 8 students[2] aged 13 years to 14 years in New South Wales who participated in the IEA *Trends in International Mathematics and Science Study* (TIMSS 2002/03)[3], the following submission provides an overview of the effect of Year 8 student participation in sport and a range of sedentary activities on students' achievement in mathematics.

Testing for TIMSS 2002/03 was carried out in 49 countries. Participation was based on a strictly controlled, two-stage stratified cluster sampling process. The sampling procedure ensured a nationally representative sample of students. In the first stage, schools were randomly selected to represent states and sectors. In the next stage, one mathematics class of Year 4 or Year 8 students was randomly selected to take part in the study. To ensure unbiased data, the International Study Centre set minimum participation rates of 85 per cent of sampled schools and 85 per cent of sampled students (or a combined school and student participation rate of 75 per cent). In Australia, 10 030 students in 414 schools participated in the main sample of TIMSS 2002/03. The data used in support of this submission were weighted to take account of the sampling effects.

While sedentary lifestyles have been the focus of public health policy, this submission examines the effect of time spent participating in sport and sedentary activities on academic achievement in mathematics.

Media coverage has highlighted the prevalence of children and adolescents who are overweight, and the impact of increased time children spend on sedentary activities. This issue has increased in importance as a public health issue in Australia. This increase in the proportion of overweight children has been attributed to dietary

[2] This number represents the number of valid cases on the variables reported in this submission.

[3] The full details of Australia's sample and results can be found in the national reports *Summing it up: Mathematics achievement in Australian schools in TIMSS 2002* and *Examining the evidence: Science achievement in Australian schools in TIMSS 2002* (Thomson & Fleming, 2004a, 2004b).

changes, an increased sedentary lifestyle, increased television viewing and computers (Alfano et al, 2002). In addition, with increased access to the Internet and mobile phones, children and adolescents need not even leave the home to maintain contact with their friends (ABS, 2001).

There is a growing body of research focusing on the impact of sedentary activities on children and adolescents. Taveras et al. (2007) report early adolescence as being characterised by a steep drop in physical activity, an increasing amount of media exposure and sedentary behaviours. Today fewer children walk or ride their bikes to school, rather they rely on travelling by car or bus. This is partly a result of parental concerns over children's safety. Nelson et al. (2006) also highlight the importance of needing to gain a comprehensive understanding of trends in physical activity and various sedentary behaviours and their impact on health-related outcomes, particularly during early adolescents, when long-term behaviour patterns are being established.

In response to these issues, the Australian Government developed Physical Activity Recommendations for Children and Young People (2006). These state that children and young people should participate in at least 60 minutes (and up to several hours) of moderate- to vigorous-intensity physical activity everyday, and children and young people should not spend more than two hours a day using electronic media for entertainment (e.g. computer games, Internet, TV), particularly during daylight hours.

Participation in various leisure activities have been attributed to both positive and negative effects on children and adolescents. Cocke (2002) found sport enhances academic achievement through increased concentration, attention levels, perseverance, decision-making skills, problem solving, self-esteem, and higher levels of energy. Livingstone et al. (2003) reported physical activity enhanced psychological well-being, including reducing depression and anxiety.

Examination of the research literature related to academic achievement clearly highlights the benefits to be gained from regular participation in sport or other forms of physical activity over sedentary activities. For example, Shejwal et al. (2006) found television viewing has been linked to poor concentration, poor academic motivation and performance. Watching videos has also been attributed to increased aggressive behaviour and social isolation. However, Subrahmanyam et al. (2000) found the use of computers was related to positive effects on cognitive skills, development of spatial

skills, and the ability to follow instructions and directions. However, increased use of computers and the Internet may be linked to increases in loneliness, and physical and mental health problems including social phobia and depression (Phillips, 2007).

It is ACER's view that, while participation in leisure activities is important in maintaining a healthy lifestyle, it is also important to identify at what point the amount of time spent in leisure activities begins to negatively impact on students' academic performance.

Based on the sample of Year 8 students who participated in the TIMSS 2002/03 study, Figure 3 shows the distribution of how much time students spend in sport and predominantly sedentary activities before or after school on a normal school day.

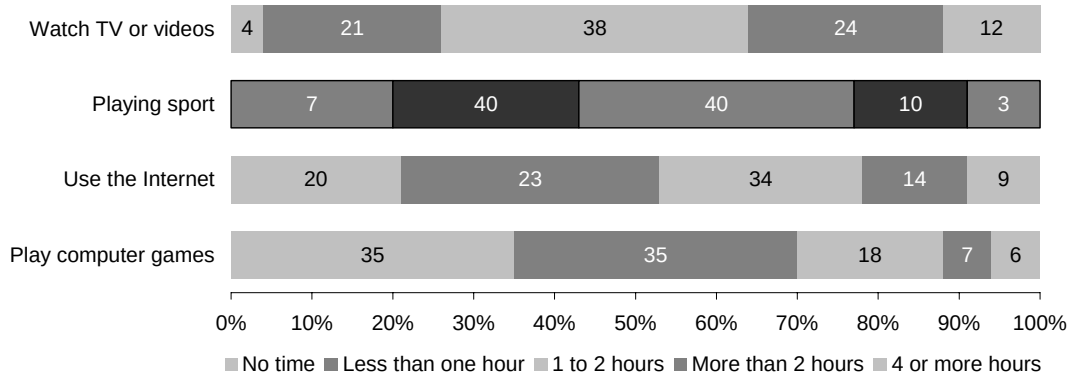

Figure 3 Percentage distribution of how much time students spend in various activities on a normal school day in NSW *(playing sport in bold)*

Figure 3 shows the percentage distribution of how much time students spend in various activities on a normal school day in NSW. It allows the calculation of the proportion of students in NSW who were exceeding the daily-recommended amount of time using electronic media on a normal school day; 36 per cent of students reported they watched in excess of 2 hours of television or videos, 20 per cent of students reported not playing any sport. (Note that these data do not include the amount of time students might be spending on any of these activities at the weekend.)

Figure 4 shows the relationship between mathematics achievement by amount of time spent playing sport on a normal school day in NSW.

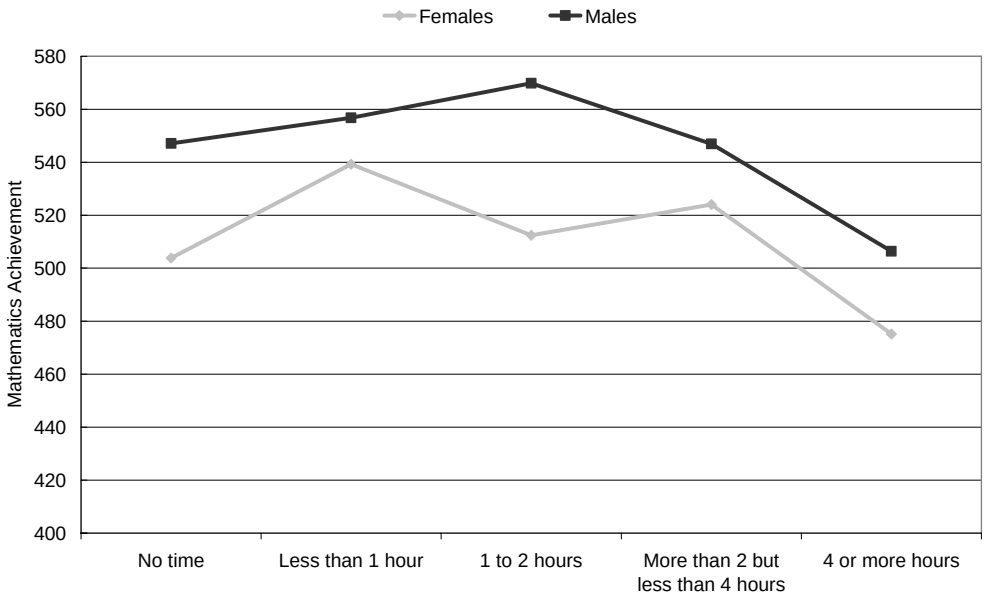

Figure 4 Year 8 mathematics achievement by amount of time spent playing sport in NSW

Figure 4 shows males' mathematics achievement tends, on average, to peak for those who play between 'one to 2 hours' of sport on a normal school day, after which their achievement level begins to decline (The difference in mean scores is statistically significant at the $p< 0.05$ level, using the independent samples t-test.) In contrast, for females, on average, their achievement tends to peak for those who play 'less than one hour' of sport before their achievement levels begin to decline ($p<0.05$). Females who play 'more than 2 hours but less than 4 hours' of sport tend to have a second peak before their achievement levels begin to decline. For males there appears to be an optimum amount of time – between one and two hours per day – spent playing sport in terms of mathematics achievement ($p<0.05$), while less than one hour per day is the optimum amount of time for females ($p<0.05$).

Figure 5 shows the relationship between mathematics achievement by amount of time spent watching TV or videos on a normal school day by gender for NSW.

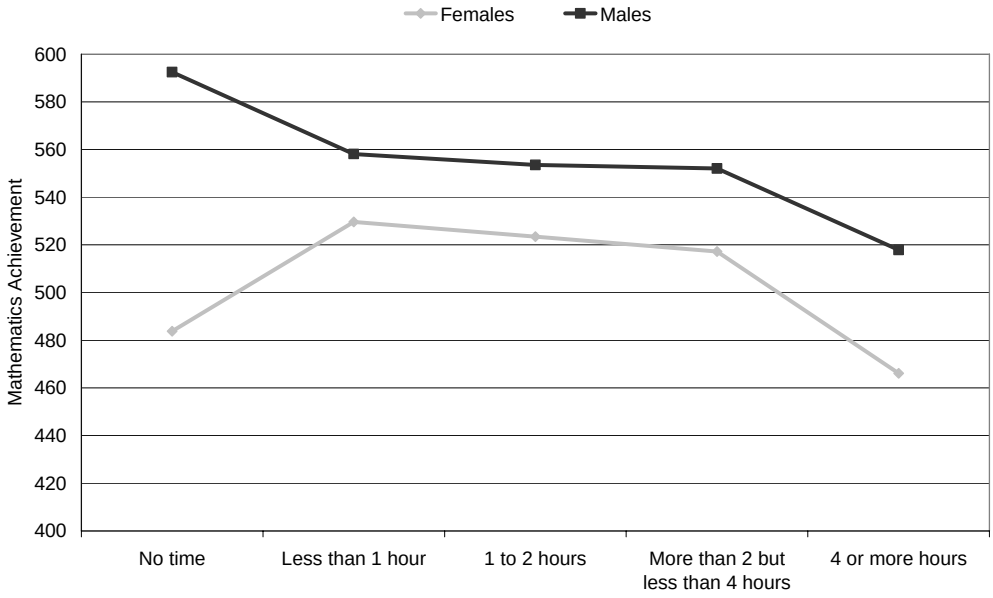

Figure 5 Year 8 mathematics achievement by amount of time spent watching TV or videos in NSW

Figure 5 shows irrespective of the amount of time spent watching TV or videos males, on average, attain a higher mathematics achievement level than females in NSW. Males' mathematics achievement tends to peak for those who spend 'no time' watching TV or videos, declines to a plateau for those who spend 'less than one hour' to 'more than 2 but less than 4 hours' watching TV or videos on a normal school day before their achievement level begins to further decline. In contrast, females' mathematics achievement tends to peak for those who spend 'less than one hour' watching TV or videos before their achievement levels begin to decline. For both males and females the mean achievement scores off the plateau at 'more than 2 but less than 4 hours' are significantly different at the $p > 0.05$ level.

Figure 6 shows the relationship between mathematics achievement by amount of time spent playing computer games on a normal school day by gender for NSW.

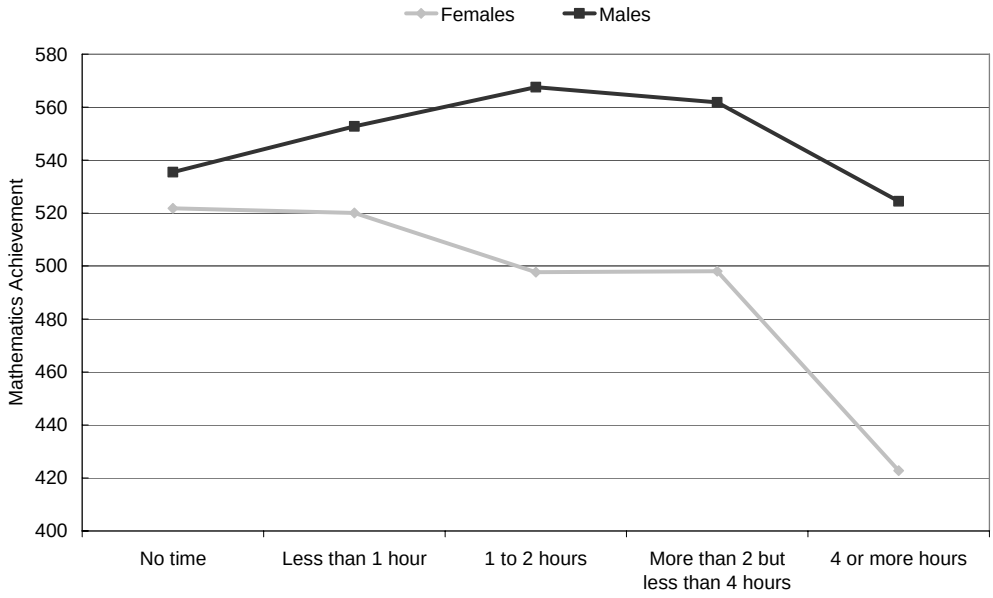

Figure 6 Year 8 mathematics achievement by amount of time spent playing computer games in NSW

Figure 6 shows irrespective of the amount of time spent playing computer games males, on average, attain a higher mathematics achievement level than females in NSW. Males' mathematics achievement tends to steadily rise until they reach '1 to 2 hours' of playing computer games, after this, their achievement steadily declines. In contrast, females who spend 'no time', or 'less than one hour' playing computer games attain their highest level of mathematics achievement after which a steady decrease in achievement occurs as the number of hours increase. For both males and females the mean achievement scores off the plateau at 'more than 2 but less than 4 hours' are significantly different at the $p > 0.05$ level.

Figure 7 shows the relationship between mathematics achievement by amount of time spent using the Internet on a normal school day by gender for NSW.

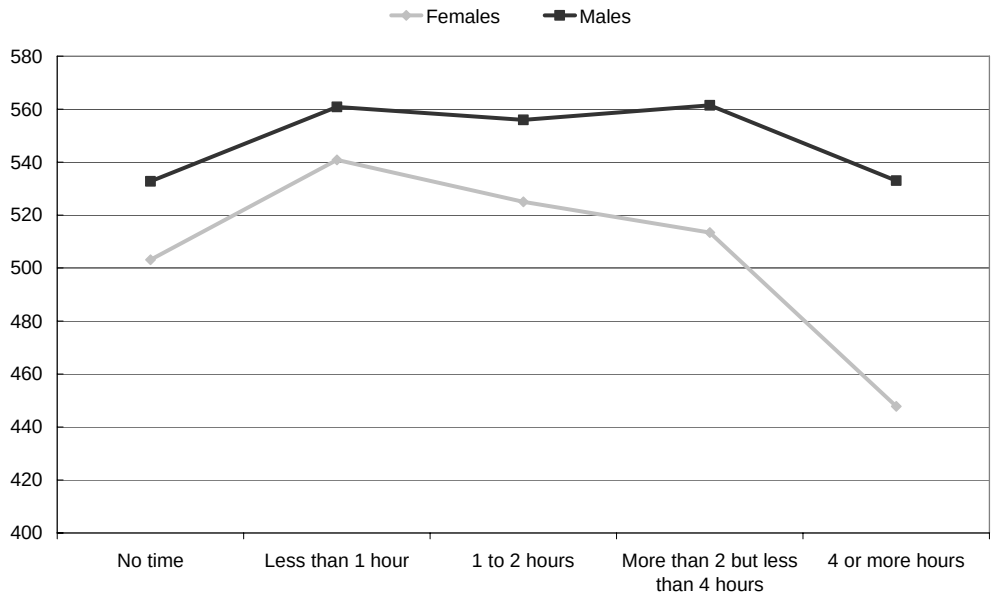

Figure 7 Year 8 mathematics achievement by amount of time spent using the Internet in NSW

Figure 7 shows irrespective of the amount of time spent using the Internet males, on average, attain a higher mathematics achievement level than females for NSW. Both male and female achievement tends to steadily rise to the point where they spend 'less than one hour' using the Internet. For both males and females this represents a significant difference in mean scores at the p> 0.05 level. Here, male and female mathematics achievement begins to decline with females demonstrating a steeper decline. In contrast, males tend to reach a slight plateau once they start to spend ' more than 2 but less than 4 hours' on the Internet before their performance drops away. The drop in achievement represents a significant difference in mean scores for both males and females at the p> 0.05 level.

The data presented in this submission show that, on average, males in Year 8 in NSW, irrespective of the type of activities they participate in, score higher than females in mathematics achievement as measured by the mathematics component of the TIMSS 2002/03 assessment. However, across both sexes the same broad patterns can be seen when it comes to sedentary activities and playing sport. A moderate amount of time spent watching television, doing homework, playing sport, surfing the internet or playing computer games are all associated with an increase in achievement in Mathematics. Too little sport or too much sedentary or sporting activity is associated with lower levels of achievement. These findings seem to demonstrate the importance

of balance and moderation in the amount of time students spend in sporting and in sedentary activities.

Conclusion

The evidence presented indicates that to improve the learning of children in NSW they need to participate in physical activity or sport to a moderate level and not be discouraged from sedentary past-times, providing these too are pursued in moderation. In short, children should be encouraged to maintain a balanced lifestyle.

Thinking about a career

Author: Adrian Beavis

Focus: the impact of age, gender and disadvantage

Adrian Beavis is Research Director of the Policy Analysis and Program Evaluation program.

The quest to define an occupational aspiration begins in childhood (Gottfredson, 1980, 1996, 2002), and the years from the age of 9 to 14 are important in this quest.

How children grow to understand the world of work

According to Gottfredson (1980; 1996; 2002), the quest for an occupation is a quest to locate oneself in the world of work. The key features of this world that guide this quest are sex composition (or 'sex type'), socioeconomic status and the type of work. As Taylor and Pryor (1985, p. 173) assert: the sex type of an occupation confirms gender identity, its prestige confirms social identity and the type of occupation confirms psychological identity.

Using the socioeconomic status and the sex composition of occupation, it is possible to map out the world of work. Figure 8, based upon 2001 Australian Census data, shows how occupations are distributed across these two dimensions.

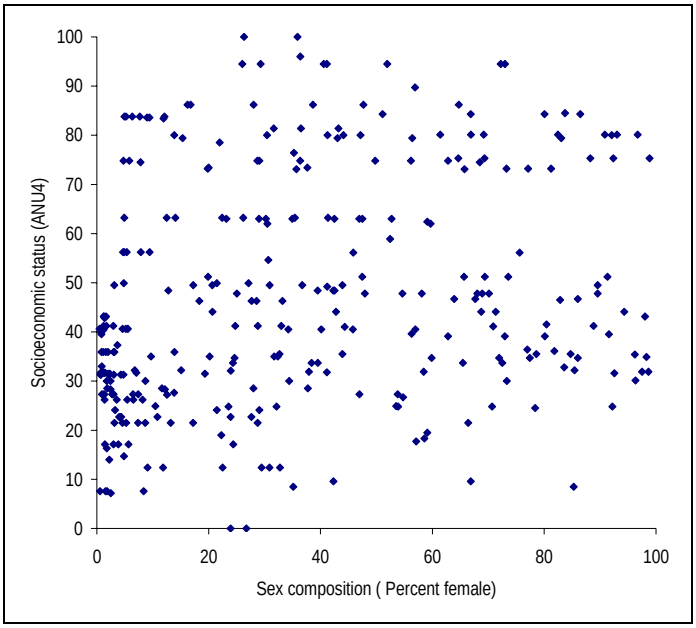

Figure 8 Map of Australian occupations showing the socioeconomic status and the sex composition of 317 occupations in 2001

So how does a child find a location and make his or her way to it in this world? The child does so in stages, paralleling his or her cognitive development, acquiring an increasingly sophisticated understanding of him- or her-self and of the world of work. These developmental changes lead the child to reject some parts of the world of work as unsuitable. This is a process of circumscription.

Figure 9 shows the map of occupations of a very young child. Here the universe of occupations is not discriminated along any dimension. For the young child all (known) occupations are equally acceptable. Consequently – to use Gottfredson's nomenclature – the 'zone of acceptable alternatives' consists of all occupations.

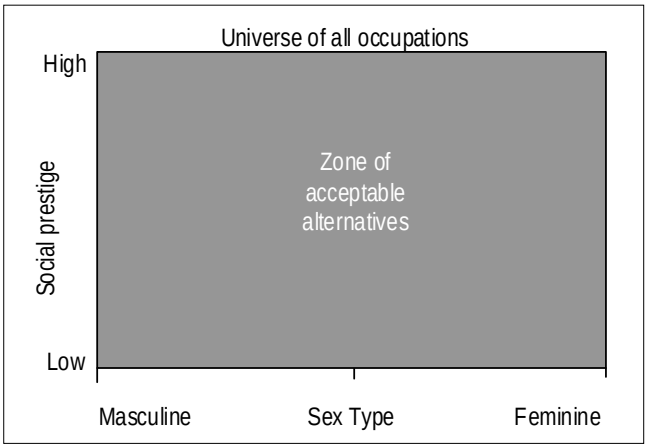

Figure 9 Graphical depiction of a map of occupations showing the zone of acceptable alternatives for a young child

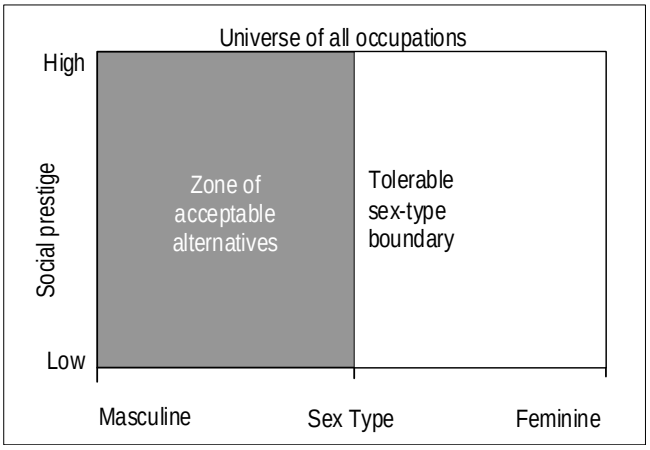

Figure 10 Graphical depiction of a map of occupations showing the zone of acceptable alternatives for a 6- to 8-year-old male child

At the next stage of his or her cognitive development the child can distinguish between occupations based on sex type. Figure 10 shows the hypothetical map for a 6- to 8-year-old male child. In this figure it can be seen that the zone of acceptable

alternatives is considerably smaller than in Figure 9. All those occupations to the right of the sex type boundary in Figure 10 will, typically, no longer be considered acceptable choices by boys. Conversely, girls will no longer consider occupations to the left of the sex-type boundary.

Figure 11 shows a (hypothetical) map of occupations for a middle-class male of average intelligence at around the age of 14 years. In Figure 11 the zone of acceptable alternatives is markedly smaller than in the two previous figures. It is also more complex now having three adjustable boundaries. According to Gottfredson (1981, p.558), the location of the tolerable effort boundary – which lies across the top of the zone of acceptable alternatives – is set by how much effort the individual is prepared to make in pursuing entry to an occupation. Its location is also influenced, Gottfredson (1981, p.558) claims, by an individual's intelligence. Generally, the higher the self-perceived intelligence of the individual the higher this boundary will be located on the social prestige scale (Gottfredson, 1981, p.565). The location of the tolerable level boundary – which is the lower boundary of the zone of acceptable alternatives – is set by the social prestige perceived as appropriate to the self concept (Gottfredson, 1981, p.562ff). Generally, the lower the social prestige background of an individual the lower this boundary will be set (Gottfredson, 1981, p.563).[4]

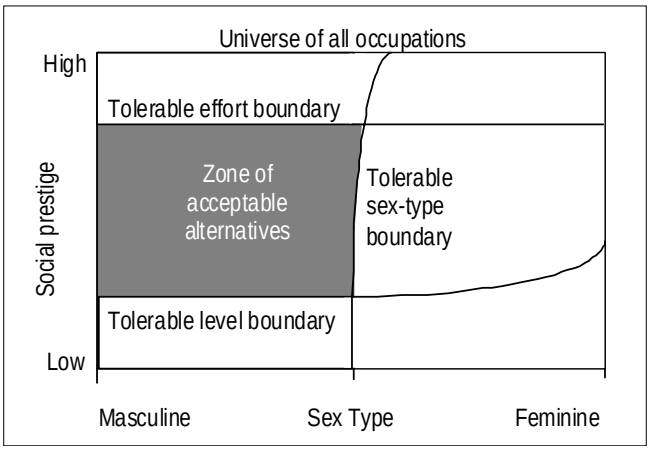

Figure 11 Graphical depiction of a cognitive map of occupations showing the zone of acceptable alternatives for a 9- to 13-year-old male child of average intelligence. ***After Gottfredson, (1981, p. 557)***

[4] In Figure 11 the sex type boundary curves towards the right because males will tend to trade off sex type for higher social prestige in their choice of occupation. (The effect seems, however, to be quite slight.) Similarly, the tolerable level boundary for males rises as occupations become increasingly feminine. For females the sex boundary will curve towards the left.

Together the above three figures show how the development of vocational aspirations is a process of successively drawing boundaries around a progressively smaller area within the world of work using increasingly complex information.

Implications

This section briefly describes two important implications that flow from this understanding of the development of vocational aspirations.

Efficiency and fairness concerns

From a policy perspective, a potential issue is the extent to which the 'tolerable level boundary' is set by the socioeconomic status of the child's family. If Gottfredson is correct, children from lower socioeconomic status backgrounds, who have the same ability, interests and put in the same amount of effort as a child from a high socioeconomic status family background, will aspire to a lower level job than the high socioeconomic status child. If this occurs, then this represents a potential loss of talent to the economy, and a loss of opportunity to the individual. It also implies unfairness since aspirations are being shaped, in part, by social background.[5]

Educational choices

Many educational choices are strongly influenced by vocational interests—both in school subject choice (Ainley, Robinson, Harvey-Beavis, Elsworth, & Fleming, 1994; G. Elsworth, Harvey-Beavis, Ainley, & Fabris, 1999) and post-school course choices (G. R. Elsworth, 1994; G. R. Elsworth, Harvey-Beavis, Gilding, & Briant, 1986, undated 1986; Harvey-Beavis & Elsworth, 1998; Holland, 1997, pp 115ff. and 164ff.). The outcome of these educational choices may be that a large part of the world of work will be inaccessible because prerequisite knowledge will not have been acquired—even for occupations within that part of the world of work which attracts the young person (their 'zone of acceptable alternatives').

For young people, especially those closer to the age of 14 and so more mature, school subject choice represents an early expression of where they see themselves as being located in the world of work. These choices are thus, in part, a statement of who the

[5] There are 'sampler' programs in place that help address this issue. For example, the Australian Business Community Network (ABCN) (http://www.abcn.com.au/) based in Sydney but nationwide in its activities, runs the GOALS program. GOALS is a one-on-one mentoring partnership that aims to widen the life choices of students. Among many of its objectives, it aims to introduce students to the 'top of the town' so that some of the mystique surrounding corporate life is removed. With this, options are opened up. GOALS thus provides an entrée to a new part of the world of work.

students think they are and where they ‘fit’ in society. The more limited their view of society and of the opportunities it offers, the more limited will be their scope for choice.

Conclusion

The evidence presented indicates that to improve the learning of children in NSW they should be provided with the opportunity to sample as widely as possible those opportunities available in the world of work that are most strongly related to their interests and ability. If resourcing is limited, then these opportunities should be preferentially distributed to children from low socioeconomic status backgrounds since they may tend to under-estimate their potential in the world of work.

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