

# **Enhancing the Academic Achievement of Indigenous Students in Rural Australia**

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## ***Abstract***

Indigenous students in the middle-school years who experience difficulties in basic mathematics are a particularly vulnerable group. During these years gaps in performance between educationally disadvantaged students and their peers widen, potentially leading to ongoing economic and social disadvantage. This proposal reports on a teaching intervention referred to as *QuickSmart*, which has been particularly successful with Indigenous students from rural communities who perform in the bottom 30% of the achievement spectrum in Australia-wide tests. Evidence is drawn from the learning progress of Indigenous middle-school students who completed the *QuickSmart* numeracy program. These data show, based on effect-size statistics, academic growth for students of up to two years over the course of a 30-week program.

## ***Objectives***

The *QuickSmart* numeracy program is a research-based intervention program for middle-school students that addresses current educational needs in schools. Between 2001 and 2011, close to 600 schools from New South Wales, the Northern Territory, Western Australia, South Australia, Tasmania, the Australian Capital Territory and Victoria implemented *QuickSmart* numeracy programs. This represents more than 10,000 participating students, of whom approximately 30% or 3000 identified as Indigenous students.

Through improving the educational attainment of lower-achieving students, including many Indigenous students who live in rural areas, the research that is the basis of this proposal addresses core factors that can enhance the life potential of many young Australians. The significance of this research lies in the links that exist between basic academic skills and quality of life outcomes in terms of improving Indigenous health and well-being, enhancing social inclusion and ameliorating systemic disadvantage. The systematic review conducted by DeWalt, Berkman, Sheridan, Lohr, and Pignone (2004) is an example of the evidence available about these links. DeWalt et al. (2004) analysed 684 articles to confirm that individuals with low levels of basic academic skills are up to three times more likely to experience poorer health because of their lack of knowledge about disease markers and health resources. Aboriginal students with poor levels of basic skills, then, are particularly at risk, with the proportion of the population

achieving at least the minimum standard of literacy and numeracy attainment decreasing as their geographic remoteness increases (Council of Australian Governments (COAG), 2009; Pegg & Panizzon, 2007).

Pursuing the links between health and academic achievement further, a recent combined report from the Australian Institute of Health and Welfare and the Australian Bureau of Statistics (2009) suggested that poor health hinders many Indigenous children's school attendance and, consequently, restricts their ability to learn. As Howard, Cooke, Lowe, and Perry (2011) argue, enhanced educational opportunities for Indigenous students are most likely to occur through relevant curriculum, quality instruction, increased student participation and fostering the engagement of Indigenous community members. The instructional approach and implementation practices of *QuickSmart* include many features that address just these types of educational improvement.

### ***Perspectives***

The *QuickSmart* instructional approach focuses on the role of automaticity in developing students' fluency and facility with basic academic facts, and is informed by relevant literature associated with learning difficulties/disabilities and quality instruction (e.g., Baker, Gersten, & Lee, 2002; McMaster, Fuchs, Fuchs, & Compton, 2005; Westwood, 2007), effective instruction (e.g., Rowe, Stephanou, & Urbach, 2006), mathematics education (e.g., Fuchs & Fuchs, 2001) and educational interventions (e.g., Deshler, Mellard, Tollefson, & Byrd, 2005; Marston, 2005). It provides instruction that is intense enough (30 minutes, three times a week in small-group settings) and of sufficient duration (for up to 30 weeks) to make a difference to participating students. A teacher or competent teacher assistant commences instruction after completing the initial two-day workshop that introduces the program. Two more two-day professional learning workshops for school staff members involved in *QuickSmart* (i.e., teachers, teacher assistants and support teachers) are scheduled during the 30-week intervention period during the first year.

It is important to note that the structured approach of the *QuickSmart* program, with its appropriate use of technology, and emphasis placed on both practice and strategy instruction, is very much in tune with how many teachers consider students can be usefully supported. *QuickSmart* is particularly attractive because it is a carefully structured program that focuses on improving numeracy skills. The program shares many of the features of effective third-wave teaching outlined in the discussion paper prepared for the Taskforce on Indigenous Education (MCEETYA, 2001). This is particularly important because Indigenous students make up approximately one-third of the total number of *QuickSmart* students who have completed the program since 2001. Specifically, in numeracy lessons:

- there is an emphasis on self-regulation, metacognition and self-esteem building, with the goal of increasing independence in learning;
- there are opportunities for extended deliberate practice of unknown facts and in the application of taught strategies;
- student progress is regularly monitored and extensive, detailed feedback is given in each lesson;
- attention is given to clarifying the mathematical use of language in ways that respect each student's language background;
- reinforcement, initially extrinsic, gives way to intrinsic motivation as the long-term goal;
- there is a focus on problem solving through developing a strategic approach to understanding the question posed and making a suitable plan to solve it; and,
- problems to be solved are at an appropriate difficulty level for the students and, where possible, reflect classroom demands.

### ***Methods and Data Sources***

*QuickSmart* can be considered applied research “that is undertaken to acquire new knowledge but directed towards a specific, practical aim or objective” (Higher Education Research Data Collection (HERDC), 2011, p.8). It does not represent a single research activity. Informing *QuickSmart* is a longitudinal programmatic coordinated set of research projects aimed at understanding and addressing numeracy and literacy under-performance in middle-school students across Australia. The research that underpins *QuickSmart* is focused particularly on cognitive processing, the conditions necessary for gaining facility with lower-order tasks or basic academic skills, and the potential complementary effects of improved mastery of these skills on higher-order learning processes.

The *QuickSmart* project uses a quasi-experimental research design involving collecting and analysing pre-test and post-test data from two groups of students: (i) the “*QuickSmart* students,” who participate in the numeracy and/or literacy intervention programs; and (ii) “comparison students”, who do not participate in the intervention programs. The decision to use a quasi-experimental design (whereby participants and non-participants are carefully selected according to set criteria) rather than an experimental design (where participants and non-participants are randomly assigned) was informed by ethical considerations. A paramount consideration was to offer appropriate support to as many students as possible to give them the opportunity to improve their academic performance.

## Results

Increasing numbers of Indigenous students have participated in the *QuickSmart* numeracy program in the North Coast Region and the New England Region of New South Wales (NSW), and the Northern Territory since 2006. As demonstrated by the sample analyses discussed below, Indigenous students who participated in the numeracy intervention in all these regions have made impressive academic gains that are comparable to the academic gains made by non-Indigenous *QuickSmart* students.

To explore these research findings the following summary tables (Table 1 and Table 2) have been created to consider data for New South Wales and the Northern Territory, respectively. These tables focus on the independent tests used to assess the efficacy of the program. In NSW the test administered is the Progressive Achievement Test in Mathematics (PATM) produced by the Australian Council for Education Research (ACER). In the Northern Territory, the test used was developed by the Numeracy and Assessment branch within the NT Department of Education and Training based on previous territory-wide Multi-level Assessment Program (MAP) tests.

Table 1 and Table 2 below show the data for Indigenous *QuickSmart* students, non-Indigenous *QuickSmart* students and average-achieving comparison students from the same school settings. In terms of gain scores, the *QuickSmart* groups exceeded the comparison group in all analyses. This means that *QuickSmart* students were able to “close the gap” between themselves and their average-achieving peers at the basic level of increased scores. Also, all growth scores for *QuickSmart* students were above the anticipated five units of growth over the period of a year suggested by ACER, despite students not having access to a calculator during the test.

Table 1: Paired data for NSW Indigenous, non-Indigenous and comparison students on PATM assessments

Students Groups	Students with paired data	Pre-Test Mean (Standard Deviation)	Post-Test Mean (Standard Deviation)	Average Gain Scores	Effect Size
Indigenous QS students	195	39.57 (9.77)	46.18 (10.79)	6.61	0.64
Non-Indigenous QS students	511	43.25 (9.56)	49.77 (9.54)	6.52	0.68
Comparison students	216	52.03 (10.47)	55.06 (11.42)	3.03	0.28

Analysis in terms of effect size also supports the findings associated with gain scores. In the analyses of data from *QuickSmart* cohorts shown in Table 1 and Table 2, the effect sizes reported were in excess of 0.4, which indicates an important level of growth. The effect sizes for the *QuickSmart* cohorts were also considerably higher than the effect size of the growth recorded for the comparison students, which fell within the expected range for average-achieving students of 0.2 to 0.4. Overall, the results of the program for Indigenous students mirror very closely the findings of the larger non-Indigenous cohort. The key point here is that despite starting from a lower base, the Indigenous students recorded gains equivalent to those of the larger cohort of *QuickSmart* students. Hence, participation in the numeracy program facilitates work with students at their level and enables them to achieve similar rates of growth as non-Indigenous students as measured by a standardised assessment.

Table 2: Paired data for Indigenous, non-Indigenous and comparison students on Northern Territory-developed assessments

Students Groups	Students with Pre-Test paired data	Pre-Test	Post-Test	Average Gain Scores	Effect size
		Mean (Standard Deviation)	Mean (Standard Deviation)		
Indigenous QS students	258	17.68 (8.62)	23.45 (9.07)	5.77	0.65
Non-Indigenous QS students	268	23.10 (7.84)	29.41 (7.46)	6.31	0.82
Comparison Indigenous students	82	24.96 (9.24)	28.43 (9.14)	3.47	0.38
Comparison Non-Indigenous students	167	31.54 (8.98)	34.51 (8.07)	2.97	0.35

These quantitative data complement the extensive qualitative data from parents, teachers and the students themselves collected at participating schools. Teachers' reports indicate that many students who undertake *QuickSmart* exhibit positive behaviours and attitudes such as: improved attention and participation in class; a willingness to take risks with and to enter into discussions about their learning; a decrease in behaviour issues inside and outside the classroom; improved school attendance; and a willingness to see themselves as learners.

## Significance

Overall, the data discussed highlight the impressive gains in academic growth that *QuickSmart* Indigenous students have achieved. In most cases, the effect size of these students' academic growth is more than double that of the comparison students' growth. Without doubt, the focus on low-achieving Indigenous students is an important one for research in school education. It is particularly important that findings are rigorously evaluated because the student population targeted in this work is among the most vulnerable in our education system (Dobson, 2001; Fuchs & Fuchs, 2001). It is obvious that educationally disadvantaged students should participate only in support programs that are accepted as educationally sound. Interventions based on unsubstantiated ideas have the potential to take up these students' valuable instructional time and to result in little, or no, maintained gains in performance (Strain & Hoyson, 2000).

In terms of the significance of this research program, assessment data from national testing programs (e.g., National Assessment Program Literacy and Numeracy (NAPLAN), 2008) underscore the necessity to improve educational outcomes for students who are not reaching minimum standards. Further, because of the widening gap between outcomes for Indigenous and non-Indigenous students in Year 3, Year 5 and Year 7, there is a particular need to identify approaches that are effective for Indigenous students early in their schooling experiences and during their middle school years (Frigo et al., 2004).

In summary, the *QuickSmart* research program is concerned with the provision of appropriate instruction with the aim of improving the basic academic skills and performance of low-achieving students, including Indigenous students. Such improvement has clear educational benefit and accompanying positive long-term social implications.



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