A longitudinal evaluation of *QuickSmart:* An effective Australian intervention to improve numeracy

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Abstract

This paper reports data from the evaluation of the numeracy component of a long-running educational intervention, covering the period from 2001 to 2008. *QuickSmart* is both an intervention and research project operating in Australian schools. It is a structured intervention program designed for middle-school students (ages 10 to 13 years) with significant learning difficulties in basic literacy and numeracy. The program aims to increase fluency (automaticity) in the most basic skills that underpin proficient performance in reading and in mathematical calculation and problem solving. The guiding principle is that building fluency and confidence in basic skills enables students to devote much more cognitive effort to the higher-order processes involved in reading for meaning and in solving mathematical problems. The *QuickSmart* project includes a strong research component that investigates the effectiveness of the intervention through collection of targeted students' pre-test and post-test scores on standardised achievement tests. These *QuickSmart* students' scores are compared to the pre-test and post-test results of average-achieving comparison students who come from their same class groups. The data indicate that the intervention has significantly improved the numeracy performance of more than 2,000 students with learning difficulties from over 90 schools in Australia. Students' average improvement has been of the order of two years' growth as measured by effect size calculations. The improvement of *QuickSmart* students on standardized scores has also helped 'narrow the gap' between their performance and that of average-achieving students. The evaluation of this program across differing contexts indicates the importance of consolidating students' basic academic skills and providing ongoing support to instructors through a well-designed professional development program.

Schools in the United States, Australia and the UK share a common problem — too many of their students fail to achieve an adequate standard in basic numeracy. Evidence of this can be found in the United States within the data reported from the National Mathematics Advisory Panel Report (Gersten et al., 2009), in Australia from the results from the National Assessment Program:

Literacy and Numeracy (NAPLAN) and the earlier nationwide ‘benchmarking’ assessments (Commonwealth of Australia, 2008; MCEETYA, 2009), and in Britain from regular surveys conducted with both school students and adults (e.g., Coben, 2003; OfSTED, 2005). It is now accepted generally that, for a variety of reasons, at least five to ten per cent of students have significant and ongoing difficulties in learning mathematics. Current teaching methods and in-class intervention strategies such as differentiating learning activities according to students’ abilities (e.g., Ferguson, 2009) do not appear to overcome the learning problems experienced by most of these students. Unfortunately, the achievement gap between their numeracy skills and the expected standard for their age group widens over time. As a result, the majority of these students lose confidence in their own ability to cope with basic mathematics and feel powerless to change the situation. In many cases, their problems are still evident when they become adults, often placing limitations on the types of employment they can enter (House of Commons Public Accounts Committee: UK, 2009). It has been stated that:

> No child should move into her or his teenage years, and on into adulthood, unable to read, write or work with numbers. Without these fundamental skills, our young people are too often denied the opportunity to move on to further or higher education or to find well paid jobs. They are also at much greater risk of social exclusion (DENI, 2008, p. i).

Causes of learning difficulty

There are many factors that contribute to learning difficulties in the numeracy domain, ranging from some that are intrinsic to the student and others that are clearly environmental. Among the intrinsic factors operating in some cases are visual or auditory perceptual difficulties, information processing deficits, poor attending behaviours, working memory problems, and lack of effective learning strategies (Geary, 2005; Lerner & Kline, 2006; Westwood, 2008). In addition, one or two students in every hundred may have a specific learning disability (*dyscalculia*) that adversely affects their ability to acquire number skills and concepts or to process quantitative data (Landerl, Bevan & Butterworth, 2004; Wadlington & Wadlington, 2008). The environmental factors that adversely affect learning of numeracy skills include ambivalent community attitudes toward the importance of learning mathematics, lack of family support and encouragement, and an absence of structured learning opportunities in the preschool years. Children from disadvantaged backgrounds tend to be over represented among students with poor numeracy skills. For example, in Australia it has been found that students in remote and rural areas and Indigenous students have some of the lowest numeracy scores in national testing programs (Doig, 2001; Graham, Bellert & Pegg, 2007). However, among the most important environmental influences on numeracy development is the quality and effectiveness of the instruction that students receive in school (Farkota, 2005; Martin, 2007; Pincott, 2004). Unfortunately, the currently favoured teaching approaches for mathematics that focus primarily on open-ended investigation, activity, and problem solving are not always effective in building and reinforcing basic number knowledge and computational skills. This is particularly the case among students with learning difficulties. Research has consistently found that, regardless of the underlying causes of their difficulties, these students learn best through explicit and systematic instruction that provides ample opportunities for fundamental knowledge and skills to become firmly established through guided practice and corrective feedback (Ellis, 2005; Gersten, Jordan & Flojo, 2005; Rowe, 2006; Swanson, Hoskyn & Lee, 1999). They do not benefit from being plunged into open-ended learning activities that lack clarity and structure.

With these issues in mind, in 2001 a team from the University of New England's National Centre for Science, Information and Communication Technology and Mathematics Education for Rural and Regional Australia (SiMERR) designed an intervention program – titled *QuickSmart* – to reverse the trend of ongoing poor academic performance for students who have been struggling at school for several years and who are caught in a cycle of continued failure (Graham, Bellert, & Pegg, 2007). *QuickSmart* targets students with learning difficulties in the middle school years and focuses on increasing their fluency (automaticity) in basic literacy and numeracy skills. This paper synthesizes research data on the effectiveness of the *QuickSmart Numeracy* component, as revealed in evaluation data covering the period 2001 to 2008.

Key features of *QuickSmart* numeracy intervention

QuickSmart is a teacher- or teacher aide-directed program that operates for 3 x 30-minute lessons per week over a period of 30 weeks, usually spanning 3 school terms. Students participate in the sessions in pairs and are taught in a withdrawal setting, not in the mainstream classroom. They are taught to develop effective strategy use and they participate in targeted practice activities. *QuickSmart* students spend considerable lesson time becoming ‘quicker’ at recalling number facts and performing simple calculations, and ‘smarter’ in strategy use. Both structured and incidental strategy instruction are important features of numeracy lessons, with the aim of moving students on from relying on slow and error-prone strategies (especially count-by-one strategies) to the use of more sophisticated and efficient strategies and automatic recall. Focusing on various domains in numeracy, the program enables instructors to plan instruction that meets individual students’ learning needs and also provides students with opportunities to self-monitor and to receive immediate, formative feedback.

The content of *QuickSmart Numeracy* covers (but it is not limited to) addition, subtraction, multiplication and division facts, and triple addition tasks such as 7 + 4 + 3 (where a quick and effective mental strategy is to recognise instantly that 7 + 3 makes 10, and then add 4). The *QuickSmart* program emphasises the usefulness and relevance of facts and strategies to regular classroom activities. This feature of the program is essential for facilitating transfer of learning to other settings. In relation to this point, it is also important to acknowledge that once students’ recall of basic facts and performance of basic tasks becomes truly automatic, they cannot help but have these facts and skills available for use in other settings and on more complex tasks. It is important that middle-school students have ready access to such prerequisite academic skills that enable them to engage fully with challenging academic work.

QuickSmart learning and teaching strategies are drawn directly from research evidence identifying effective methods for students with learning difficulties (e.g., Bryant et al., 2008; Gersten, Jordan & Flojo, 2005; Rowe, 2006; Swanson, 2000). These include explicit strategy instruction, modeling, discussion, questioning, feedback, guided and independent practice, and frequent reviews. Each lesson involves brief revision of work covered in the previous session, a number of guided practice activities featuring overt self-talk, discussion and practice of memory and retrieval strategies, and games and worksheet activities followed by timed and independent practice activities.

Ongoing, formative assessment is an integral part of the *QuickSmart* intervention program and ensures that the learning program is tailored to extend the existing knowledge and skills of individual learners. Most lessons conclude with an assessment using the computer-based Cognitive Aptitude Assessment System (CAAS) to provide the student and the instructor with information about the accuracy and speed of recall of basic facts. This software was developed at the Laboratory for the Assessment and Training of Academic Skills (LATAS) at the University of Massachusetts (Royer & Tronsky, 1998; Royer, Tronsky, & Chan, 1999).

The main principles underpinning the *QuickSmart* program are that it:

- is designed to improve students' information retrieval times;
- frees working-memory capacity from an excessive focus on routine tasks;
- fosters automaticity in basic tasks;
- utilises explicit teaching based on understanding and deliberate practice, not on rote learning;
- has time (as well as accuracy) as a dimension of learning;

- integrates assessment tasks into each lesson with a focus on individual improvement;
- maximises student on-task time in a structured but flexible lesson format;
- provides extensive materials including teaching resources, speedsheets, flashcards; and
- incorporates the Cognitive Aptitude Assessment System (CAAS) to assess students' speed and accuracy on basic mathematics tasks.

The following principles have guided both the development and scaling up of the *QuickSmart* intervention:

- Programs designed to address the learning needs of low-achieving middle-school students should be intense, of significant enough duration to make a difference, and conducted in small class instructional settings.

- An extensive professional learning program for teachers, teacher aides and executive members of schools and education jurisdictions should be an important component of any sustainable instructional intervention.

- Improving the skill base of teacher aides should be a focus of attention for all support programs, especially those in rural and remote areas or schools that are difficult to staff and where teaching staff mobility is a significant factor.

- To ensure sustainability, National, State, regional and school level stakeholders need to coordinate their efforts and collaborate to ensure the fidelity of the program, and the viability of its implementation and scaling up processes.

The professional development program accompanying *QuickSmart* is focused on supporting teachers to understand and provide:

- effective instruction that maximises student on-task time and opportunities for meaningful feedback; and provides learning scaffolds to ensure students experience improvement and success;

- deliberate practice that is integral to every lesson, allows for success and is focused on providing targeted feedback to improve learning;
- guided and independent timed practice activities;
- strategy instruction and concept development;
- confidence in their students by encouraging a ‘can do’ attitude;
- appropriate teacher and peer modeling; and
- motivational academic activities that develop fluent performance.

A teacher coordinator is required in each participating school. Professional learning is offered during school time on six professional learning days. Support is then ongoing, as required. An introductory session for principals is also provided.

The implementation of *QuickSmart* in Australia has been supported by research grants from the Australian Research Council, the Federal Government, project funds from SiMERR, and extensive cash and in-kind support from the Northern Territory and New South Wales. Since 2001, when the intervention was first introduced on a small scale in New South Wales, *QuickSmart* has been implemented on an increasingly expansive scale. In 2008 the program had extended to more schools in New South Wales and the Northern Territory, and was being introduced in South Australia, Victoria, and the Australian Capital Territory. The number of schools involved so far in 2009 is 148 schools.

QuickSmart is one of the main intervention programs recommended for adoption by schools in the *National Partnership on Literacy and Numeracy*, a joint initiative of the Australian and New South Wales governments (State of New South Wales, 2009). Many of the resources required to implement the *QuickSmart* programs are provided in the *QuickSmart Numeracy* and Literacy Kits. The Kits for both programs include administrative and organisational information, learning/teaching resources, and a *QuickSmart* DVD. In addition, *QuickSmart* provides the Cognitive Aptitude Assessment System (CAAS) software for ongoing assessment throughout the duration of the *QuickSmart* programs. Details of *QuickSmart* can be found online at:http://www.une.edu.au/simerr/quicksmart/pages/index.php

Evaluating *QuickSmart*

A critical research aspect of the implementation of *QuickSmart* has been the attention paid to the ongoing intensive evaluation of the program. Over the period 2001 to 2008 systematic data collection has accrued substantial empirical evidence regarding the value and applicability of the *QuickSmart Numeracy* program (Graham, Bellert, & Pegg, 2001; Graham, Bellert, Thomas, & Pegg, 2007; Pegg, Graham, & Bellert, 2005). The accumulation of such evidence over time from multiple jurisdictions across a range of geographic and socio-economic contexts is, we believe, a more powerful evaluation procedure for establishing the veracity, usefulness, effectiveness and sustainability of the program than any single controlled experimental study.

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. These comparison students are average achievers in mainstream mathematics, are the same age as the *QuickSmart* students, and are drawn from the same schools. They complete the selected CAAS sub-tests in numeracy at the beginning and the end of the intervention period and also participate in the standardised testing sessions. Pre-test and post-test data are collected by school-based *QuickSmart* co-ordinators for both sets of students using the CAAS test results and the independent state-wide or standardised achievement tests results. These data help to quantify ways that *QuickSmart* narrows the achievement gap for low-achieving students, and serves to isolate any effects attributable to the instructional program. Interviews and surveys of students, parents, teachers, and principals involved in *QuickSmart* have also yielded important qualitative data on the program's effectiveness.

All data from schools other than those in the Northern Territory are sent to the SiMERR National Centre at the University of New England, where they are transferred to electronic spreadsheets or word processing programs. In the case of schools in the Northern Territory, officers from the Department of Education and Training have (since 2006) independently collected data from participating schools and then undertake the analysis before forwarding the results to SiMERR.

Participants

Table 1 summarises the various cohorts of middle-school students with mathematics learning difficulties who have participated in *QuickSmart* since 2001, together with the numbers of normally-achieving students used for comparison purposes in each year.

Table 1: Summary of *QuickSmart* data for all Regions/School Sectors, 2001 – 2008

Year	Schools	*QS* Students	Comparison Students	All Students (*QS* + Comp)	Indigenous/NESB Students
2001	2	20	13	33	N/A
2002	3	18	0	18	N/A
2003	10	63	40	103	N/A
2004	8	72	43	115	N/A
2005	13	130	141	271	N/A
2006	19	245	118	363	116
2007	55	780	269	1049	215
2008	91	772	206	978	268
TOTAL	201	2100	830	2930	599

Note: QS = *QuickSmart.* NESB = *Non English speaking background*

Analysis of data

Analysis of quantitative data involved comparing the standardised tests and state-wide assessments results, followed by analyses of the CAAS measures using MANOVA and ANOVA statistics and a follow-up using step-wise regression. Effect Size calculations were completed where appropriate for all the available *QuickSmart* data. The major rationale for utilising MANOVA was to examine whether the *QuickSmart* intervention program was associated with differences in mean scores obtained on a considerable number of dependent variables. The rationale for using step-wise regression was that this procedure makes no assumptions about the relative importance of variables and instead selects variables for entry into the model in an order that reflects the extent to which they explain shared variance, and the extent to which this sharing is statistically significant. Conversely, step-wise regression excludes variables from the model that do not explain a sufficient portion of the shared variance. A feature of this procedure is that when two variables overlap in their capacity to account for the shared variance, the variable with the greater capacity to do so is entered.

In addition to these analyses across the whole set of the *QuickSmart* data from 2001 to 2008, Effect Sizes were also calculated for each region or Territory where *QuickSmart* has been implemented since the program began. Effect Sizes were used here to quantify the effectiveness of interventions relative to comparison groups. Discussion of Effect Sizes enables researchers to move beyond the simplistic, ‘Does it work or not?’ to the more useful, ‘How well does it work in a range of contexts?’ Based on the work of Hattie (2009) an insignificant effect size is around 0.1, an average effect size is around 0.3, important effect sizes begin above 0.4, and significantly important effect sizes occur above 0.6. Data on Effect Sizes in this program are reported later in the paper.

Standardised tests

The main yardstick used for assessing progress over time was the Progressive Achievement Test (PAT) in mathematics (ACER, 2005). It is important to note that over the eight-year span of this analysis, versions of the PAT used in schools have varied. Therefore, where possible, raw scores have been transformed to scale scores (PATM) which are consistent across all versions of the PAT tests.

Cognitive Aptitude Assessment System (CAAS)

Measuring changes in accuracy and automaticity of basic academic skills and the recall of basic facts is an integral part of this research. Upon admission to the *QuickSmart* program students complete an assessment process consisting of CAAS tasks that measure the speed and accuracy of hierarchically arranged basic mathematics tasks. Speed is measured using tasks that involve the appearance of a stimulus on the computer screen followed by the student responding into a microphone. The CAAS provides highly accurate measures of how rapidly students complete the tasks and an assessor then scores the response for accuracy. The CAAS assessment process involves completion of tasks that measure number identification, and a range of addition, subtraction, multiplication and division tasks. The CAAS data comprise results from five tests based on sets of twenty randomly generated individual questions. The five tests are referred to as: number naming, addition, subtraction, multiplication, and division. In each test, scores are collected for both percentage accuracy (accuracy) and the average time taken for a response to each question (speed).

Results

Looking first at the evidence obtained from the pre- and post-testing using PAT, the following data can be reported. Difference scores based on the available raw scores from PAT in mathematics indicated that overall the average difference score for the 1354 *QuickSmart* students was 5.63 (SD = 6.84) compared to an average difference score of 3.78 (SD = 7.62) for the 530 comparison students.

Using available PATM data, the descriptive statistics indicate that the difference scores for 573 *QuickSmart Numeracy* students averaged 6.70 (SD = 7.50), while difference scores for the comparison students averaged 3.67 (SD = 7.04). Importantly, the gain for 120 Indigenous students with PATM difference scores averaged an impressive 7.07 points (SD = 8.66). Table 2 displays mean difference scores for data from the Progressive Achievement Tests in Mathematics.

Table 2: Means and Standard Deviations for PAT Difference Scores by *QuickSmart* and Comparison Students

Group	*QuickSmart*		Comparison	
	Mean	SD	Mean	SD
Raw Score Difference	5.63	6.84	3.78	7.62
PATM Difference	6.70	7.50	3.67	7.04

A between-groups multivariate analysis of variance (MANOVA) was conducted to determine the effect of group membership (*QuickSmart* or Comparison) on four dependent variables (DVs), (i.e., difference scores based on PAT pre-test and composite score data). Significant effects were found for group membership on the multivariate dependent measures, Wilks' Λ= 0.71, $F(4,671) = 67.75$, $p<0.001$. Univariate tests (Analysis of variance (ANOVA)) provide an indication of whether specific independent variables (IVs) are significantly associated with specific DVs. The main effect for treatment condition was statistically significant for difference scores based on the raw PAT scores ($F(1,674)=35.19$, $p<0.001$), PATM scores across all versions of the PAT tests ($F(1,674)=16.42$, $p<0.001$), and PAT stanine scores ($F(1,674)=14.33$, $p<0.001$).

Table 3 presents the means and standard deviations for the PAT mathematics tests.

Table 3: Means and Standard Deviations for each PAT Mathematics Test Dependent Variable for *QuickSmart* and Comparison Students

	QuickSmart		**Comparison**	
Group	**M**	**SD**	**M**	**SD**
RawScore Dif Cohen's *d* = .59	4.93	5.14	2.20	4.30
PATM Dif	6.61	7.41	3.85	7.18
PctlRnkg Dif	11.87	14.72	9.53	16.74
Stanine Dif	1.04	1.15	.633	1.16

Looking next at the data obtained from the CAAS assessments, Table 4 summarises the MANOVA and ANOVA statistics for all CAAS assessments in mathematics.

Table 4: Influence of mathematics intervention group on mathematics outcomes

Dependent Variable	**df**	**Df error**	**MS**	***F***	**Sig.**
Numerical identification speed	1	582	2.361	9.379	**
Numerical identification accuracy	1	582	15.899	0.688	NS
Addition speed	1	1020	93.537	40.958	***
Addition accuracy	1	1020	2216.907	21.527	***
Subtraction speed	1	967	135.264	49.685	***
Subtraction accuracy	1	967	6233.29	44.278	***
Multiplication speed	1	953	256.718	40.564	***
Multiplication accuracy	1	943	17388.33	58.71	***
Division speed	1	914	379.903	60.969	***
Division accuracy	1	914	24344.567	78.079	***

**$p<0.01$, ***$p<0.001$

Significant outcomes were obtained for group membership (*QuickSmart* versus Comparison students) on all the CAAS measures except for the accurate identification of numerals, a very simple subtest that did not differentiate between the students because of the high accuracy levels of both groups. This group of findings is easily interpretable and important in terms of the design of the

QuickSmart Numeracy program and its focus on the accuracy of basic facts and speed of recall.

The major outcome of the step-wise regression was that the *QuickSmart* numeracy intervention predicted all of the mathematics change scores. This means that the effect of the *QuickSmart* program was strong across both the standardized and CAAS measures.

Turning now to the Effect Size analyses, the data here were obtained from schools in various regions of NSW and from the Northern Territory. It is useful to be reminded again that in educational research Effect Sizes below 0.2 are considered weak because an appropriate and 'normal' range of growth over an academic year for a student cohort would be within the range of 0.2 to 0.4. Effect-size scores of 0.4 to 0.6 are considered strong, those between 0.6 and 0.8 are considered very strong, while those above 0.8 represent substantial improvement of the order of approximately three years' growth.

The official report evaluating *Quicksmart* (NCSiMERRA, 2009) contains Effect Size data tables for many separate regions participating in the program and for different years of involvement. The scope and length of this paper do not allow for reproduction of all these tables, so for convenience Effect Size results are summarised here. In this longitudinal study, the Effect Sizes obtained across schools and jurisdictions are remarkably consistent, ranging from 0.49 to 0.80, with greater effects evident for the *QuickSmart* students over the comparison group's performance. Secondly, across the board the Effect Sizes based on the scores of the *QuickSmart* students are well above the expected yearly average growth of around 0.3. For example:

- In the Northern Territory during 2006, 2007, and 2008 the effect size growth of many hundreds of *QuickSmart* students based on state-wide tests was 0.68, 0.60 and 0.78, respectively compared to a considerably lower effect size of approximately 0.3 or less calculated for the average-performing comparison cohorts.

- Students from the eight schools which participated in *QuickSmart* in the NSW North Coast Region in 2007 recorded an effect size of 0.75 on the ACER PAT tests. In contrast, the comparison cohort's effect size value was calculated to be 0.19. The improvement of the *QuickSmart* students represents approximately three years' growth over the course of a single year. This result improved further in 2008 with an effect size of 0.801 calculated for the *QuickSmart* sample of 238 low-achieving students.
- An analysis by an independent statistician of the large data-sets of ACER PATM scores from several hundred NSW students found that the effect sizes for *QuickSmart* students ranged from 0.59 to 0.69, with the latter figure representing those students who completed the full thirty weeks of instruction.

Some Effect Size comparisons for specific regions in NSW are summarised in Table 5.

Table 5: Effect Sizes: NSW Regions 2002 -2008

Region/Cluster	**Pre-scores PATM (SD)**	**Post-scores PATM (SD)**	**Effect Size (Cohen's *d*)**
Armidale 2002-2004 *QuickSmart* students	47.12 (8.00) *n* = 30	52.14 (9.67) *n* = 28	**0.56**
Comparison students	59 (10.29) *n* = 12	61.56 (12.48) *n* = 9	0.22
Lismore 2002-2008 *QuickSmart* students	45.36 (8.73) *n* = 62	51.74 (7.12) *n* = 64	**0.80**
Comparison students	54.94 (7.46) *n* = 17	53.63 (7.87) *n* = 16	-0.17
North Coast -2008 *QuickSmart* students	44.05 (8.24) *n* = 375	50.92 (9.53) *n* = 334	**0.77**
Comparison students	55.29 (7.93) *n* = 89	58.53 (10.31) *n* = 88	0.33

Table 6 summarises Effect Size data from the Northern Territory, as calculated independently by staff of the NT Department for Education and Training. This table contrasts the effects of *QuickSmart Numeracy* on Indigenous and Non-Indigenous students. The Northern Territory is home to a large number of Indigenous students, and their poor literacy and numeracy standards are a matter of ongoing concern. It seems, however, that the approach used in *QuickSmart Numeracy* is highly appropriate for raising the numeracy standards of these students (Effect Size 0.76).

Table 6: Effect Sizes: Northern Territory 2008

	Effect Size	Confidence Interval	Significance (wrt Comparison)
QuickSmart – All	**0.78**	± 0.07	p = 0.0029
QuickSmart – Indigenous students	**0.76**	± 0.09	p = 0.0174
QuickSmart – Non-Indigenous students	**0.88**	± 0.12	p = 0.0033

It can from the Effect Size evidence above that *QuickSmart Numeracy* has proved to be a highly effective program for increasing and accelerating the basic number skills for a wide variety of students with learning difficulties in a wide variety of settings.

Finally, the qualitative evidence obtained from interviews and surveys involving students, parents, teachers, and principals have indicated great support and enthusiasm for *QuickSmart*. Three typical comments are included below. The official report (NCSiMERRA, 2009), with sets of evidence for over 2,000 students and many hundreds of teachers and parents, contains very many more examples.

A female student's comment:

> I know my times tables better than I did. I've improved my speed by finding short ways of doing the number facts. And I know about denominators and

numerators. And how to change things into a decimal or a percentage and how to put things in the right groups. (2003, New England Girls' School, Armidale, numeracy student)

A parent's comment:

> *QuickSmart* has had a huge effect on our daughter's performance at school. Most notably the Basic Skills [Test] results. In Year 3 she was in the bottom 30% of the state. This year, in Year 5, she was in the top 30%. (2005, St Francis Xavier Woolgoolga)

An administrator's comment:

> My experiences in viewing *QuickSmart* in action in the schools in New England are all positive. I have found many students, who were previously disengaged with mathematical activities, totally engaged in the activities and process that form a major part of the intervention… Independent research in the New England region indicated that students, including Aboriginal students, make quick gains in their ability and confidence to use mathematics. (Mr Des Gorman A/General Manager, Learning and Development, NSW DET)

Conclusion

The learning difficulties experienced by many middle-school students are persistent and resistant to change unless they are provided with sustained and intensely focused personalised instruction. *QuickSmart* is an intervention program that targets, with small group instruction, those students in the lower 30% of the achievement spectrum. Analysis of data from a wide range of settings has identified impressive statistically significant gains in terms of probability measures and Effect Sizes that mirror the qualitative improvements reported by teachers, instructors and parents. Students who complete the *QuickSmart* program show general, sustained improvements in independent learning, self-regulation, metacognition and self-esteem. The strong quantitative and qualitative evidence base reported here confirms that *QuickSmart* helps to ‘narrow the gap’ for low-achieving middle-school students.

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