EDUCATION-LINE

"I SOUND JUST LIKE THE GOOD KIDS": ENHANCING THE READING ACHIEVEMENT OF MIDDLE-YEARS STUDENTS WITH LEARNING DIFFICULTIES

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Abstract

This paper outlines an innovative pedagogic intervention, *QuickSmart*, which focuses on improving reading fluency and comprehension skills. The intervention targets middle-school students experiencing difficulties with reading and understanding texts. The research presented focuses on the key role of working memory and automaticity in developing literacy for students with learning difficulties.

INTRODUCTION

Even though definitions of "learning disabilities" and "learning difficulties" vary across international contexts, a significant number of students continue to be identified with learning difficulties (LD) because of their pervasive problems acquiring and using listening, speaking, reading, writing, reasoning, or mathematical skills (e.g., Fuchs & Fuchs, 1998; Swanson & Hoskyn, 1998; Westwood & Graham, 2000). In Australia and New Zealand, under a broad definition of "learning difficulties", approximately 25% of school students are considered to have problems in academic areas at some point during their schooling. Data indicating the relatively large numbers of LD learners in Australia comes from the Australian National Benchmark assessment program (MCEETYA, 2007) that shows an increase in percentages of students not meeting established benchmarks as students proceed from Year 3 through Year 5 to Year 7.

LEARNING DIFFICULTIES IN THE MIDDLE-SCHOOL YEARS

A variety of research-based approaches have been developed to support students with emerging learning difficulties during their early school years Such intervention programs include speech and language therapy programs, small group or individual support programs, school-based learning difficulties support programs or more formalized intervention programs such as Reading Recovery (Bouck, 2005). Many young students who use these programs may have difficulties that are transitory, and with or without early intervention programs, these students catch up with their better-performing peers. However, despite effective classroom teaching and early intervention programs, there are some children who continue to struggle with learning throughout the middle-school years (Louden, Chan, Elkins, Greaves, House, Milton, Nichols, Rivalland, Rohl, & van Kraayenoord, 2000) and whose academic needs require focused intervention.

In their middle-school years, students with LD present with particular characteristics. Although, many of these students will have received some kind of learning support in the previous years of schooling, they still display persistent learning difficulties. Additionally, because many students in the middle years of schooling with LD have experienced repeated failure, they may have developed strong sensitivities to lagging behind their peers in schoolwork. These students' feelings of poor self esteem and negative perceptions of themselves as learners can lead to reduced motivation, an avoidance of risk-taking in learning, a passive disengagement from the curriculum, and behaviour problems. The lack of self-efficacy that leads students to the belief that they are unable to succeed has a highly debilitating effect on academic performance (Diener & Dweck, 1978). Experiencing sustained learning difficulties contributes to students' experience of 'learned helplessness' whereby they feel powerless, and interpret their actions as irrelevant and without impact on subsequent outcomes (Torgesen, 1982).

Along with these affective characteristics, LD students in the middle years of schooling also present with particular cognitive characteristics. In a series of research projects conducted by the National Centre of Science, Information and Communication Technology, and Mathematics Education for Rural and Regional Australia (e.g., Graham, Bellert & Pegg, 2001; Graham, & Bellert, 2005; Graham, Bellert, Thomas, & Pegg, 2007), it was observed that the strategy use of students in the middle years of schooling with LD could be characterized as dependent on a limited repertoire of tactics with an over-reliance on inefficient strategies. These observations of cognitive processing inefficiencies are consistent with findings (e.g., Ashbaker & Swanson, 1996; Keeler & Swanson, 2001) that students with learning difficulties do not implement strategies spontaneously, flexibly and efficiently and have poor declarative knowledge related to working memory performance.

LEARNING DIFFICULTIES IN READING

When designing and implementing effective teaching and learning support for students in the middle years of schooling with LD it is vital to consider the social and emotional needs of early adolescents. During adolescence, interpersonal and intrapersonal issues are of foremost importance with peer relationships the key focus (Arnold, 2000; Fuller, 2003). Learning experiences that build upon this understanding potentially meet the students 'where they are' and promote opportunities for peer connectedness. This appears to be a key factor in developing resilience in learners (Fuller, 2001).

In the middle-school years, basic reading skills (e.g., decoding, vocabulary knowledge, fluency and comprehension strategies) are routinely required to access the curriculum in all content areas. Students with LD, however, often need explicit teaching of both prerequisite skills and the key concepts of content areas. Explicit teaching – clear teaching of important skills, information and appropriate strategies – involves showing, telling, using think-aloud protocols and self talk, as well as modeling and demonstrating by both teacher and peers so that a systematic and structured approach to teaching the desired content leads students toward mastery and success. Explicit teaching also requires that the objectives and the purpose of the intended content is made clear to students and that they are provided with regular opportunities for purposeful feedback.

At all levels of schooling, effective teachers rely on a repertoire of flexible practices and authentic learning experiences that that they can selectively implement in a variety of educational situations. Pedagogical content knowledge, that is, knowing which method to use with particular content in a specific context with an individual or group of students (Mizell, 1999 cited in Beutel, 2003; Shulman, 1987) is evident when teachers modify the level of task difficulty so that students with LD have the opportunity to develop and practice successfully desired skills or strategies rather than unsuccessfully attempting difficult tasks. This kind of knowledge is particularly important when teaching higher-order processing (e.g., metacognition, cognitive strategies, and problem solving) to students with LD. Instructional interventions that constructively control task difficulty have great potential to influence student-learning outcomes positively (Vaughn, Gersten, & Chard, 2000).

Some of the most important and currently influential research findings in the field of learning difficulties have been related to establishing the relationship between deficits in phonological processing and reading problems. Stanovich (1988) posited that students with learning disabilities in reading have core deficits in phonological processing, defined as the use of information about the sounds of oral and written language. This finding is particularly important for its ability to inform early reading acquisition. Many students with LD, however, have experienced instruction that is focused primarily on phonic understandings to the exclusion of other aspects of the reading process. Importantly, research has linked deficits in phonological processing to problems in word recognition, naming speed, oral reading fluency and reading comprehension (Chan & Dally, 2001; Chard, Vaughn, & Tyler, 2002; Wolf, 2001).

In 1986, Stanovich coined a phrase, "The Matthew Effect" that has become a potent way of describing the effects of learning difficulties in reading. He proposed that students' problems with phonological processing differentially disadvantaged those with learning difficulties. Stanovich (1986) described this pattern of increasing disadvantage with each school year as "the rich get richer and the poor get poorer". The middle-school years are when the Matthew Effect in reading really begins to affect students' learning and motivation – with each passing year students who have learning difficulties fall further and further behind their peers.

With particular regard to middle-school students with learning disabilities, Swanson's (1999) meta-analysis indicated that the most important instructional components associated with their improvements in reading comprehension are:

- Directed response questioning (e.g., the teacher directing students to ask questions using a specified language or format);
- Controlling the difficulty of the processing demands of tasks;
- Elaboration (e.g., additional or redundant explanations about the concepts, procedures or steps in a strategy);
- Modelling by the teacher to demonstrate the required processes;
- Small group instruction; and
- Strategy cues that include reminders to use strategy steps.

WORKING MEMORY

The processes and functioning of working memory have been identified as a common factor in all learning difficulties. For example, Keeler and Swanson (2001, p.418) stated: "Research examining specific subtypes of learning disabilities has found that working memory deficits underlie the difficulties of students with reading and mathematical disabilities." Similarly, Miyake and Shah (1999, p.1) described working memory as "the theoretical construct that has come to be used in cognitive psychology to refer to the system or mechanism underlying the maintenance of task relevant information during the performance of a cognitive task". Other definitions similarly describe working memory as a temporary, simultaneous storage mechanism in memory geared to hold incoming information required in the performance of a complex task (Baddeley, 1992; Hulme & McKenzie, 1992; Swanson & Siegel, 2001).

In general, poor readers take more time to decode words, and have more difficulty constructing meaning from text because their limited working memory capacity is allocated almost entirely to decoding. The working memory capacity and duration of students with LD is not thought to be less than those of non LD students, rather it appears that students with LD have difficulties in efficiently coordinating processes which operate between the components of working memory (Swanson & Siegel, 2001). From this perspective fast, efficient recall, or automaticity, is a product of efficient and effective cognitive processing.

Students with learning difficulties are visibly 'slowed down' by their lack of automaticity. Automaticity develops when processes "become fast, obligatory and autonomous, and require only limited use of cognitive resources" (Wolf, 1991, p.126). Developing automaticity in reading is particularly important for middle-school students because these students need to comprehend what they read and to problem-solve in order to engage appropriately with the middle-school curriculum. Students are better able to focus on higher-order skills when sub-skills such as word recogntion are less effortful. Until this time, automatic processes may have little or no effect on the processing capacity available to perform complex tasks because only the retrieval of practiced information is relatively effortless (Borich & Tombari, 1997).

QUICKSMART: A RESEARCH-BASED INTERVENTION FOR MIDDLE-SCHOOL STUDENTS WITH LEARNING DIFFICULTIES

Over the last eight years, the National Centre of Science, Information and Communication Technology and Mathematics Education for Rural and Regional Australia (SiMERR) has developed intervention programs for both literacy or numeracy dubbed *QuickSmart* (see http://www.une.edu.au/simerr/quicksmart/pages/index.php). These programs, which incorporate extensive and specifically designed paper and material resources as well as the Computer-based Academic Assessment System (CAAS), are designed to improve students' information retrieval times to levels that free working-memory capacity from an excessive focus on mundane tasks (see Pegg, Graham, & Bellert, 2005 and Graham, Bellert, Thomas & Pegg, 2007 for a description of the numeracy program). The name *QuickSmart* is appropriate because the aim of these programs is for students to become quick (and accurate) as well smart in strategy use when completing classroom tasks. This paper has a specific focus on the implementation of the *QuickSmart* reading intervention in a high-school setting in NSW Australia.

QuickSmart program incorporates technology developed at the Laboratory for the Assessment and Training of Academic Skills (LATAS) at the University of Massachusetts. The Computer-

based Academic Assessment System (CAAS) is a software package with record keeping capabilities that measures simple perception, letter naming, word naming, pseudoword naming (e.g., plok), concept activation, and sentence understanding. Students respond to the computer-based tasks by answering into a microphone attached to the computer as soon as a stimulus appears on the computer screen.

The CAAS system measures how rapidly students complete the tasks (vocalisation latency data). An examiner then scores the response for accuracy. The students' assessment results are automatically summarised and made available in either a graph or report form that is easily interpretable by both students and teachers. The students' graphs depicting accuracy results aim for 100% while their graphs recording response speed aim to decrease the average time taken to respond to each assessment item. The CAAS is a unique component of the *QuickSmart* program. It provides on-going monitoring of students' basic academic skills and supports the instructional focus of the *QuickSmart* intervention.

PARTICIPANTS

The students who participated in the *QuickSmart* reading program described in this study were drawn from the school population of a disadvantaged high school in a coastal community on the mid-North Coast of New South Wales. Of the 650 students enrolled at this school approximately fifteen percent come from unemployed family backgrounds. Eleven percent of the school population identifies as Aboriginal or Torres Strait Islander. The school also includes a number of refugee students from Sudan and Somalia. The school employs one full-time Learning Support teacher. During the early 2000s, this school's state-wide test results on the Years 7 and 8 English Language and Literacy Assessment (ELLA) and Secondary Numeracy Assessment Program (SNAP) were consistently below the state and regional averages with at least half of the students in Year 7 performing below National Benchmarks in literacy and numeracy.

In 2005, when the school was first funded through the NSW Department of Education and Trining Priority Schools Program, the decision was made to target the literacy problems of Year 7 students. As part of this decision the *QuickSmart* program was implemented in the school beginning in July 2005 with 47 students enrolled in the literacy strand. This article describes the progress of a cohort of students who were selected on the basis of their low literacy scores on the standardised Progressive Achievement Tests (ACER, 2002) and teacher recommendation. The group of students who participated in the *QuickSmart* Program during 2006 included nine Indigenous students who were selected specifically to take part in the intervention.

PROCEDURES

The *QuickSmart* program ran for 32 weeks with Year 7 students over three consecutive school terms. Three teachers' aides delivered the instruction after attending professional development sessions focused on practical and theoretical aspects of the instructional approach. The high school's learning assistance teacher supervised the *QuickSmart* program. Students attended lessons in pairs for three half-hour sessions each week with the same instructor. Where possible the pairings matched students with similar learning obstacles impeding their reading.

Instructional methods used in the *QuickSmart* intervention focus on a variety of practice and recall strategies to consolidate understanding and develop fluency with the basic reading skills of word recognition, relevant phonics instruction, vocabulary knowledge, fluent reading and comprehension strategy use. Each lesson followed a sequence of learning activities that involved revision of current content, automatic word recognition, deliberate practice activities, repeated reading of texts, discussion and practice of memory and retrieval strategies, games and worksheet activities, timed independent practice activities, and a CAAS assessment (see Figure 1).

Figure 1: The QuickSmart Reading Lesson Form

***QuickSmart* Reading Lesson Format**

1. Understanding / Vocabulary Check (5 minutes)

To begin the lesson, review and discuss the current Focus Word List. Use the Word Study Sheet. Talk about the meaning of the words and how the words are used in the text.

2. Focus Words (5 minutes)

Using flashcards of the current Focus Word List challenge the students to see how many of the flashcard words they can read in 1 minute. Graph results and discuss improvements and errors.

3. Repeated Reading to develop Fluency (5 minutes)

Using the selected reading passage that accompanies the Focus Word List, establish how many words each student can read in one minute. Always read for meaning. Graph results and discuss improvements and errors.

4. Read/Comprehension Strategies (5 minutes)

Use the strategies contained in the Literacy Resource Folder to scaffold responses to a variety of comprehension passages across curriculum areas.

5. Assessment (5 minutes) (One student per QuickSmart session)

A student completes a CAAS assessment and graphs the results. Students discuss their results with the instructor and set goals for next time.

6. Games (5 minutes)

Play some literacy games to help students become fast and clever at automatically recognising words or demonstrating word meaning. Games include Memory, *QuickSmart* Bingo and the Word Meaning Game. These games provide opportunities for students to apply the literacy skills being developed during *QuickSmart* sessions.

DEPENDENT MEASURES AND ASSESSMENTS

Data relating to students' automaticity, operationalised as response time and accuracy, were collected using the CAAS. On three occasions, at the beginning, middle and end of the program all participating students were assessed on a wide range of CAAS tasks (e.g., word recognition, cloze sentence understanding, non-word decoding). A standardised test of reading comprehension (Progressive Achievement Tests from the Australian Council for Educational Research (ACER)) was used before and after the intervention to assess students' broader reading achievement.

In addition to these measures, during the intervention a brief CAAS assessment on a particular sub-test skill was administered at the end of most lessons. Other on-going assessment information was derived from many of the activities included in the program such as flashcards and other timed activities, repeated reading, worksheets and reading books. This information was an important part of the teaching and learning cycle used in *QuickSmart* lessons. Specific task-related feedback based on this ongoing monitoring alongside the graphical display of student performance data were powerful motivational features of the program.

RESULTS AND DISCUSSION

At the conclusion of the *QuickSmart* program a range of data was collected including final CAAS assessments, standardised test scores, interviews with participants and their teachers and surveys of parent views, as well as opportunistic data available from state-wide testing. This paper focuses on results from the standardised test of reading comprehension, the CAAS assessments and examples of qualitative comments from parents of *QuickSmart* students.

STANDARDISED TEST SCORES

The Progressive Achievement Test (ACER, 2000) of reading comprehension was administered to participating students. Although it is difficult for students with LD to show improvement on standardised measures, all but one of the Year 7 students increased their post-test percentile rank scores. The average percentile score for *QuickSmart* students at pre-test was 34.42 (21.9)

compared to 52.7 (25.5) percentile points at post-test. Statistical analysis on scale scores using a one-way analysis of variance indicated that this was a was a highly significant increase in test performance ($F_{(1, 46)} = 16.37$, $p <. 001$, Cohen's $d = .77$). This result supports the proposition that increased accuracy and automaticity of students' basic academic skills results in improvements on more challenging literacy activities.

DATA FROM THE COMPUTER-BASED ACADEMIC ASSESSMENT SYSTEM (CAAS)
The data presented in Table 1 shows average group response times and accuracy for CAAS sub-tests in reading measured before and after the intervention. All individual participants showed speed improvements and accuracy maintenance or improvement in most of the sub-tests. These results indicate the efficacy of *QuickSmart* as an intervention that supports students to improve automaticity in basic academic skills like word recognition and sentence-level cloze tests.

Table1: Average Group Improvements in Speed and Accuracy

CAAS subtest	Ave response latency pre-test (in seconds)	Ave response latency post-test (in seconds)	Ave Accuracy pre (%) (in seconds)	Ave Accuracy post (%) (in seconds)
Word Recognition	1.3 (0.71)	0.63 (0.23)	98.2 (9.0)	97.5 (2.1)
Sentence Comprehension	6.92 (1.3)	2.42 (1.3)	87.16(4.7)	96.1 (5.5)

Opportunistic data in the form of value-added scores from the New South Wales state wide testing program, English Language and Literacy Assessment (ELLA) were also positive for participants in the QuickSmart program. After years of trailing other schools in their region, this school was placed first in its grouping of four schools in 2006. (The scores on state-wide tests further improved in 2007.) Average value added growth scores for the school were 3.3 growth points for reading compared to the state average of 2.6, and 2.4 points for language compared to 2.2 for the state. Only the value added growth score for writing (which is not a component of the current *QuickSmart* intervention) of 0.7 for the school was lower than the state average of 2.1.

Students have commented on how the *QuickSmart* program has impacted on their school lives throughout the intervention. For example, one student commented in a memorable quote that, "I didn't know I could read like that. I sound just like those good kids!!"

In addition, parents have commented not only about their children's improved academic performance but how the program has impacted on wider issues.

> **Mother**: Since my daughter started QS we have seen a change in her attitude, from being, from thinking she was dumb, to thinking that probably she could achieve something. There has been a boost in her confidence, not just in maths and or English but in every subject area at school.
>
> **Father**: Also socially there has been a more confidence, greater confidence with her socially. In fitting with other people, and just feeling really confident that she can do something now. And that she is not dumb. That's been the biggest thing… and she just loved competing against herself.

CONCLUSION
Because the *QuickSmart* intervention has a strategy orientation to students' basic academic skill performance, it offers an approach that is individualised, responsive and carefully monitored. The learning difficulties experienced by many middle school students are persistent and resistant to improvement without this kind of sustained and intense personalised instruction. The *QuickSmart* program also offers extensive professional learning experiences that engage and encourage executive teachers, experienced teachers and teacher aides to better address the learning needs of low-achieving middle-school students. Conclusions arising from this research program are that:

- Research evidence should inform policy positions and systemic approaches to addressing the needs of low-achieving middle-school students.

- Programs designed to address the learning needs of low-achieving middle-school students should be intense, of significant duration, and conducted in small class instructional settings.
- An extensive professional learning program for teachers, teacher aides and executive members 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 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.

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