IMPLEMENTING A MULTILEVEL LITERACY PROGRAM FOR A CHILD WITH AUTISM

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ABSTRACT
The aim of this case study was to examine the effectiveness of a systematic multileveled reading program targeting all sub skills of the reading continuum for a child with Autism Spectrum Disorder and a Moderate Intellectual Delay. Individualised adaptations and visual supports were used both at the assessment and intervention level. Significant improvements were noted in phoneme-grapheme correspondence and sight word recognition following 16 intervention sessions. Results also indicated development in phonological awareness skills and phonics and evidence of the ability to generalise skills was shown. Skills were maintained following intervention and there was an increase in the participant’s ability to access the classroom literacy curriculum. Implications of these results and directions for future research are discussed.

INTRODUCTION
Autism is a developmental disability that significantly affects verbal as well as non verbal communication and social interaction (The Autism Society of America, 1993, cited in Colasent and Griffith, 1998, p. 414). The single most prognostic indicator for young children with autism, however, is language ability (Koegel, 2000, p. 385).

The term literacy encompasses the ability to engage in meaningful communication with others using the skills of reading, writing, listening and speaking (Pierce & Porter, 1996, p.142). It has, therefore, been established that language and literacy skills are “mutually enhanced by each other” (Sénéchal, LeFevre, Smith-Chant & Colton, 2001, p. 444) and further, that the promotion of reading skills indeed assists some students with ASD to advance their oral language skills (Colasent & Griffith, 1998; Koppenhaver & Erickson, 2003; Wolfberg, 1999, cited in Lanter & Watson, 2008, p. 34). To a student with autism and complex communication barriers, exposure to the printed word is like water to the desert (Broderick & Kasa- Hendrickson, 2001, cited in Kluth, 2003, p. 151) and its significance to students with complex communication needs has, therefore, been highlighted in the literature for well over a decade (Koppenhaver, 2000; Koppenhaver & Yoder, 1993; Zascavage & Keefe, 2004; Mirenda, 2003).

Despite the call, on the part of researchers, to address the literacy skills of students with limited verbal abilities, such students...
have, however, often been excluded from accessing literacy curricula due to beliefs that they would be incapable of learning how to read (Lanter & Watson, 2008, p. 35; Kluth, 2003, p. 135; Kluth & Chandler-Olcott, 2008, p. 27). An insistence on adhering to reading readiness prerequisites has shown the potential to create further barriers to literacy (Zascavage & Keefe, 2004, p. 229) in that students with autism may exhibit an uneven profile in developing the varied sequential skills along the reading progression. They typically have difficulties in the area of phonics and phonological awareness (Kluth & Chandler-Olcott, 2008, p. 107) with whole word reading as a relative strength (Nation, Clark, Wright & Williams, 2006).

Literature overwhelmingly supports the notion that students who are seriously at risk of reading failure need explicit and systematic phonics instruction to become literate (Foorman & Torgesen, 2001, p. 208; Torgesen, 2002, pp. 15-17). While evidence does exist that students with moderate intellectual disabilities can acquire phonics (Al Otaiba & Hosp, 2004; Barudin & Hourcade, 1990), other researchers caution educators to bear in mind that various approaches to phonological awareness and phonics may work well for some whilst having little or no effect on others (Kluth and Chandler-Olcott, 2008, p.108).

It is, however, maintained that the process of learning to read promotes phonological skills and that the relationship between the two is reciprocal, with each having a positive effect on each other (Morais, Carey, Alegria & Bertelson, 1979, cited in Cossu, 1999, p. 223; Gillon, 2004, Goswami and Bryant, 1990, cited in Larsson, Sandberg & Smith, 2009, p. 370).

The purpose of this case study was to examine the effectiveness of a systematic multileveled reading program simultaneously targeting all sub skills of the reading continuum whilst taking into account the individual profile of the participant.

PARTICIPANT
The study was approved by the Research Approval Committee of Autism Australia (Aspect) as well as the Ethics Committee of the University of Sydney. The participant, Bob (pseudonym), was 10 years and 4 months at the start of this study and attends a school for children with autism. He has a diagnosis of Autism and has a Moderate intellectual delay based on the CARS. Bob generally uses individual words or a three word sentence strip with visual prompting to request his needs and wants. On the Preschool Language Scale (PLS-3), his overall receptive and expressive language skills were found to be severely delayed in a recent Speech Pathology Assessment. He has a range of sensory issues which include the need for large amounts of vestibular stimulation and proprioception throughout his school day.

Bob had previously been placed in high support needs classes where he had not received any formal and explicit literacy instruction up until the months preceding the study.

RESEARCH DESIGN AND SETTING
Because students with ASD are heterogeneous in their presentation of behaviours and unique preferences and learning styles requiring individualised instructional support (Dunlap & Fox, 2002.), this study took the form of an in-depth single case study within its natural context.

This study was composed of:

a) pretesting so as to establish a baseline

b) an intervention program which took place three times per week for 30 minutes over 6 weeks resulting in a total of 16 intervention sessions.

c) post testing immediately following intervention.

d) re testing after 7 weeks so as to establish a maintenance quotient.

Intervention and testing was conducted at the participant’s school for children with autism.
MATERIALS AND PROCEDURE
Prior to intervention, the participant was pre-tested independently by a teacher at his school using the Phoneme-Grapheme Correspondence Test, the Pre Primer Assessment List of Dolch Words and the Phonemic Awareness Assessment which was adapted to include pictures.

Following assessment, a six week program including the following components was devised:

Phoneme/Grapheme correspondence: Graphemes which Bob was not able to identify during the pre-test were targeted and individually taught to a level of instant recognition before moving on to the next one. These were taught by exposing him to the jingle of the particular phoneme using a commercial phonics program as well as a variety of tactile experiences such as forming the letter out of play dough and on a salt tray. A number of people including parents have reported that tactile approaches to be useful (Eastham, 1992, cited in Kluth and Chandler-Olcott, 2008, p. 111) for teaching grapheme-phoneme connections to students with autism.

Sight words: The participant was requested to match a sight word with its partner which had a visual depiction of the particular word beside it. For example, the word “up” was depicted by an arrow facing up. Approximately two new sight words were presented at each of the 16 sessions.

Phonemic Awareness using CVC words: Bob was required to match a word such as cat with its corresponding picture and initial sound onto a laminated activity board. Words which Bob was more likely to recognise such as a hat, dog and cup were used. During session 9, a laminated A3 sheet with a picture of some basic CVC words with 3 horizontal lines under each was provided for to him to record the initial, medial and final sound of each word with a whiteboard marker. The process of hearing sounds within words was first modelled for Bob.

Phonological Awareness: Initial sounds - In order to teach this sub-skill, cards with pictures of basic nouns such as bus, car and cat and a choice of two sounds were provided which required Bob to circle the correct sound. The words starts with... were consistently used throughout this activity in order to reinforce his understanding of what was required.

Syllabification: Clapping was used to show how many parts or syllables a word contains. Intervention began with compound words and progressed to multisyllabic words with pictures provided for each word. Bob appeared to learn this skill easily and was able to generalise it to new words where pictures were provided. Unfortunately, the duration of intervention was not long enough for the scaffold of providing pictures to be removed.

Reading texts: Once four relevant sight words were known, a level 1 reader was used to reinforce Bob’s recognition of words within context. Word-word correspondence was first modelled and Bob was required to point at each word as he read. Comprehension questions which followed were normally scaffolded by the provision of the first part of the answer, for example, The baby is... All books read in class were sent home for revision.

Throughout intervention, several sensory breaks were required such as having Bob get out of his chair to fetch various materials as well as intervals for fine motor proprioceptive tasks.

LIMITATIONS TO THE STUDY
The nature of the study which included only one participant limited the presentation of data and does not provide for the generalisability to other students with autism. Further research to assess the effectiveness of a multileveled, highly adapted literacy program including greater numbers of participants in methodologically sound studies is therefore required.

As there was no control group, it is
impossible to accurately apportion any increases in reading skills to either the intervention or the maturational process. A sharp increase in his skills was, however, noted over the period of intervention by his parents and teachers which differed from his previous learning rate. Despite these limitations, this study does provide detailed information and data on the effectiveness of a short reading intervention.

Table 1. Phoneme-Grapheme Correspondence

<table>
<thead>
<tr>
<th>Grapheme Identification</th>
<th>Pre-Testing</th>
<th>Post-testing</th>
<th>Maintenance Quotient</th>
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Table 2. Sight Words

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<tr>
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<th>Pre-testing</th>
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Phoneme-Grapheme Correspondence

Bob’s ability to identify graphemes increased significantly from his ability to recognise 8 sounds at pretest to 24 at post test. Graphophonemic connections are a necessary precursor to decoding (Whitehurst & Lonigan, 2003, cited in Lanter & Watson, 2008). Bob’s ability to develop these at a rate of roughly 1 per session may be largely due to the visual learning style used to teach these in that several studies have shown that students with ASD possess strengths in pattern recognition and visual imagery (Infantino & Hempenstall, 2006, p. 136). Temple Grandin, a woman with autism, has, herself, suggested using associative letter- sound pictures such as a picture of a cat for the c sound (1992, cited in Lanter and Watson, 2008, p. 34).

Sight Words

Post-testing on the pre-primer list of Dolch Sight Words showed a significant increase in Bob’s ability to retain the visual configuration of words having progressed from instant recognition of 1 word to 22 words following intervention. Seven weeks later, Bob was able to identify all the graphemes by sound excepting for h which he insisted on referring to as hop. This result is consistent with research which has shown that attention to sight words is reported to yield positive results (Kluth & Chandler-Olcott, 2008, p. 113).

Error analyses, from both the post-test and maintenance quotient, indicated that Bob was making use of the initial sound of the word as a visual strategy for recognition. It appears that the process of being exposed to grapho-phonemic connections simultaneously with sight word recognition may have assisted him to move beyond the Pre- alphabetic Phase where sight words are recognised without alphabetic knowledge to a Partial Alphabetic Phase where students begin to form partial alphabetic connections between some of the letters in words (Ehri, 1995).

Table 3. Phonological Awareness
Phonological awareness
As indicated on Table 3, post-testing shows that Bob had made some progress in his ability to recognise the initial sounds of words. His skills in this area appeared to have developed further during the maintenance period which could be attributed to further exposure within the classroom. Bob also showed a marked improvement in his ability to segment compound words and slightly less progress in the segmentation of syllables on the post test and these results remained stable as seen on the Maintenance quotient. His scores on the segmentation of syllables subtest were compromised by his inability to produce all the syllables of multisyllabic words so as to produce them. According to Larsson & Sandberg (2009, p. 372), it is reasonable to hypothesize that individuals with severe language impairments may differ in the specificity of their phonological representations due to their own speech production difficulties.

A skill initially tested but not focused on during intervention due to time limitations was Bob’s ability to blend compound words and syllables. These were however, re-tested so as to ascertain whether he was able to generalise skills taught in compound word and syllable segmentation to those of blending. During post-testing, he showed the ability to generalise his developing awareness of compound word segmentation by showing significant progress in this area. Improvement in his ability to blend syllables, however, was slight and correlated with his result on syllable segmentation which was hampered by articulation difficulties.

Previous evidence suggests that students with autism can have difficulties isolating sounds in verbal speech and associating those sounds with symbols (Kluth & Chandler-Olcott, 2008, p. 106). While Bob’s progress in Phonological Awareness was not commensurate with the development of his sight word vocabulary, he nevertheless demonstrated the emergence of some skill in this area. This may be because phonological awareness is best developed in the midst of print-based experiences (Moustafa, 2006, cited in Kluth and Chandler-Olcott, 2008, p. 110) providing Bob with the opportunity to generalise his skills across tasks such as in spelling activities requiring him to hear individual sounds as well as visualise these through the simultaneous development of graphophonemic connections.

Phonics
Results from post-testing and the maintenance quotient show that Bob was able to match and read 8 out of the 10 and 9 out of 10 CVC words targeted during intervention respectively. He was also able to correctly spell 5 of these on both the post-test and the maintenance quotient. While Bob’s gains in phonics acquisition are modest, he showed the ability to maintain his skills and has taken an interest in trying to spell out a number of words within the classroom. This supports the notion that, despite auditory processing difficulties, children with various developmental disabilities can benefit from phonics-based intervention (Joseph & Seery, 2004; NIDRR, 2001 cited in Infantino & Hempenstall, 2006, p. 137).

Text reading
At the completion of intervention, Bob had read a number of Level 1 readers. An informal assessment showed that he was able to read the final book during intervention at an instructional level and was able to recognise sight words covered during intervention at this level.

Intangible results
Following intervention, Bob showed an increase in his ability to access the classroom literacy curriculum by taking a more active part in phonological awareness exercises and in recognising words in shared books.
Of great significance, however, has been a notable increase in verbalisations, particularly in his ability to frequently apply the functional use of the word help, taught as a sight word, where he would previously moan loudly and scream in order to have his needs met. This highlights the reciprocal relationship between language and literacy and strongly supports the notion that language and literacy are simultaneously learned (Koppenhaver et al., 1995, cited in Mirenda, 2003, p. 275).

**CONCLUSION**

After participation in this study comprising of 16 sessions, Bob has maintained a knowledge of 25 phonographemic connections, an emerging bank of sight words as well as phonological awareness. He is reading connected text at a Level 1 Reading Recovery Level and has been introduced to the phoneme by phoneme synthesis of CVC words.

Results show that the simultaneous targeting of a number of reading sub skills created a reciprocal process whereby newly acquired skills such as sight words and letters, which relied more on visual processing, created a vehicle with which to begin exploring the relatively abstract auditory based skills of phonological awareness and phonics.

It is interesting to note that at the outset, Bob would not have been considered as conventionally “ready” to begin instruction in reading from a traditional viewpoint, taking into account his basic use of language, sensory issues and lack of phonological awareness skills. His “readiness”, however, was in his motivation to learn, his interest in books and intrinsic motivation, all of which played a significant role in his progress. The use of individualised supports and adaptations, in turn, corresponded to Bob’s level of readiness by ensuring that the program was accessible to him rather than expecting him to arrive at the program’s level as in the traditional “readiness” concept (Clay, 1993, cited in Zascavage & Keefe, 2004, p.229).

Bob is by no means a proficient reader following intervention but has certainly propelled his interest and given him a headway start which has already impacted on his expressive language. For a student with autism this is significant as print provides the visual means with which to organise one’s internal language for thought and can contribute to the development of both academic and communication skills (Broun, 2004, p.40). Bob’s emerging reading skills, despite a demonstration of conventional readiness skills, beg the question of how many people with autism might be able to learn to read and write, but are never given the necessary instructional and other supports to do so (Kliwer & Biklen, 2001, cited in Mirenda, 2003, p. 274).

**REFERENCES**


