Abstract

This article discusses the application of visual support strategies to enable the participation of students with developmental disabilities, including autism, in classroom literacy activities. Specific strategies for teaching word identification skills, reading comprehension skills, and written composition skills are presented. In addition, visual support strategies to enhance students’ ability to respond to text are discussed. Strategies presented focus on literacy development in the elementary school classroom, although several of the strategies could be easily adapted to high school situations. Several figures demonstrate how visual support strategies can be designed to increase student understanding and active participation in literacy learning activities.

In today’s society, the ability to read and write is a critical skill. Reading and writing supports communication, enhances access to information, and allows individuals to perform personal and work-related tasks with increased independence. The impact of the presence or absence of literacy skills on persons with developmental disabilities has been extensively discussed in the literature. Koppenhaver, Coleman, Kalman, & Yoder (1991) highlight the importance of literacy skills in relation to communication and the use of communication-related technology. Ryndak, Morrison, & Sommerstein (1999) discuss the influence of literacy skills on the development of interpersonal interactions. They also stress the importance of literacy skills for the expression of needs, wants, information, feelings and ideas. In addition to enhancing communication and interpersonal interactions, literacy skills result in improved access to employment opportunities (Koppenhaver et al., 1991; Singh & Singh, 1986) and educational opportunities (Browder & Xin, 1998; Koppenhaver et al., 1991). Persons with developmental disabilities who demonstrate literacy-related abilities are also more likely to demonstrate increased independence in terms of daily living skills and access to leisure activities (Singh & Singh, 1986).

Historically, students with developmental disabilities were regarded as incapable of developing literacy skills and were thus provided with instruction in functional daily living and vocational skills. As philosophies regarding the education of students with disabilities become progressively more inclusive and models of literacy instruction change from linear, bottom-up models to multi-method and multimodal (Hedrick, Katims, & Carr, 1999), students with...
developmental disabilities are not only increasingly allowed access to the regular education classroom but are more often provided with literacy learning opportunities alongside their typically learning peers. Given that students with developmental disabilities may demonstrate unique learning styles and require additional supports to benefit from classroom instruction in literacy development, the task for educators is now one of determining effective strategies that fit within the context of inclusive classroom settings.

Visual Support Strategies and Persons with Developmental Disabilities

Students with developmental disabilities, particularly autism, can experience difficulty with literacy learning activities for numerous reasons. They may experience difficulty in processing verbal instruction and thus have difficulties in accessing instruction. They may have difficulty attending to the teacher during instruction or following whole-class or small-group discussion. They may be easily distracted by extraneous sensory input and find it difficult to keep their attention focused on the instructional activities. Students may also demonstrate difficulty in verbal expression, making it challenging for them to engage in classroom literacy learning activities. Problems with expressive language may also make it difficult for educators to determine what skills, abilities, and knowledge students possess.

There is a growing body of literature suggesting that persons with developmental disabilities, particularly autism, often learn better through the use of visual support strategies (Grandin, 1995; Hodgdon, 1995; Quill, 1995; Schuler, 1995). Visual strategies include the use of photographs and/or line drawings to support understanding and enhance expressive communication skills. Visual support strategies are regularly used for scheduling (Krantz, MacDuff, & McClannahan, 1993; MacDuff, Krantz, & McClannahan, 1993; Pierce & Schreibman, 1994), communication (Bondy and Frost, 1994; Hamilton & Snell, 1993; Rotholz & Berkowitz, 1989), and behavioural support (Clarke, Dunlap, & Vaughn, 1999; Dunlap & Fox, 1999; Hodgdon, 1995). It is thought that the use of visual support strategies enhances information processing in persons with developmental disabilities who may have difficulty with speech-only instruction. While speech is processed in an auditory-temporal fashion, visual information is non-transient, allowing more time for information processing. In the literacy classroom, visual support strategies can provide both augmented input and output (Beukelman & Mirenda, 1998) for those students experiencing difficulty with auditory processing or verbal expression. Visual support strategies can also provide improved access to curriculum through the use of adapted texts and materials and allow individuals an alternate means for demonstrating their knowledge, skills, and abilities.

Visual Strategies for Literacy Development

Classroom Routines

Classroom routines are often designed to provide students with opportunities to practice communication in large and small group situations, learn to ask and answer questions effectively, and obtain
information from a variety of sources. Because these activities are often laden with spoken communication, they can present extreme challenges for students with developmental disabilities who experience difficulties with information processing or expressive communication. The addition of visual supports can assist them in accessing instruction, obtaining information, and sharing information and knowledge with both their teachers and peers.

Calendar. During daily calendar exercises, students are generally expected to attend to the teacher or student speaking, and demonstrate a number of skills such as identifying the days of the week, identifying ‘yesterday’, ‘today’, and ‘tomorrow’, count, identify and graph the weather, and read a monthly calendar. Daily calendar activities can be adapted in numerous ways to increase the meaningful participation of students with developmental disabilities. Visual supports can be added to the large group calendar using Picture Communication Symbols (PCS, Mayer-Johnson, 2001). PCS for the days of the week can be attached above the row of printed days of the week. PCS for both regular and special events, such as gym class and field trips, can be placed on the appropriate dates. PCS for ‘yesterday,’ ‘today,’ and ‘tomorrow’ can be placed on the monthly calendar or can be used to adapt a weekly pocket chart. Communication boards can also be used to support discussion during daily calendar exercises to support students in answering questions and sharing information.

Seatwork related to calendar activities can also be adapted using PCS. For those who have not developed independent writing skills, dashed line fonts for the computer, such as School Fonts Software (Mayer-Johnson, 1997), can be used to create worksheets. Figure 1 depicts a seatwork activity where the student must select the correct words to complete the sentences ‘Today is’, ‘The weather is’, and ‘I am,’ paste word strips onto the page and then trace the dashed-line font to write the words.

Figure 1
Morning Letter. Many classrooms engage in a daily letter activity, whereby the teacher writes a letter to the class that provides information about the day’s activities. The letter typically contains spelling, grammatical, and punctuation errors for students to identify and correct. PCS can be added to morning letters to support students with developmental disabilities in reading the text. The software Writing with Symbols 2000 (Mayer-Johnson, 2000) can also be used to adapt morning letters; the letter can be typed directly into the computer and either printed out for correction with a pencil or left for correction on the computer. Students of varying levels can be included in whole-class editing by ensuring that some errors target specific individual goals and capabilities. If students are to edit the morning letter independently at their desks, those with developmental disabilities can be provided with a modified letter that addresses their specific literacy goals and abilities.

Strategies for Developing Word Identification Skills

Scheduling. The use of daily schedule systems can provide more than information about daily activities. The use of schedule systems can also develop a number of early literacy behaviours and draw students’ attention to text in meaningful contexts. Students using schedule systems learn that photographs and/or symbols hold specific information related to activities and events in daily life. Students learn to refer to schedules to obtain information, make clarifications about their schedule, and communicate with others. This awareness that ‘print’ (in this case photographs or symbols combined with print) holds information is an important concept in early literacy development.

Schedules should be designed to display photographs or symbols in left to right, top to bottom order, unless the student has visual processing difficulties associated with problems crossing midline. Students with difficulty crossing midline may not be able to visually scan items from left to right and therefore may not see and/or process information from symbols to the left or right. In this case, consultation with an occupational therapist can result in suggestions for developing the ability to cross midline, which will facilitate the use of a left to right display of photographs or symbols.
symbols. Whether using photographs or PCS, text labels should always be present.

Schedule systems and related supports can also encourage the use of print for communication with others. Daily home-school papers displaying photographs or symbols of the day’s activities support communication with parents, caregivers, friends and other family members. Such communication supports can also contain a self-evaluation component and address other skills such as telling time. Figure 2 depicts a home/school paper that requires the student to simply check off completed activities throughout the day.

Matching Activities. Research has demonstrated that simply pairing text with pictures is not sufficient to develop independent word recognition skills (Harzem, Lee, & Miles, 1976; Lang & Solman, 1979; Montare, Elman, & Cohen, 1976; Newton, 1995; Samuels, 1967; 1970; Saunders & Solman, 1984; Solman & Singh, 1992). The presence of pictures with print as a single stimulus has a tendency to block attention to the print, as focus is placed on pictures, the known stimulus. It is important, then, to provide students with opportunities to develop the understanding that text is associated with photographs or PCS. The majority of research addressing problems with blocking of attention to print suggests stimulus fading procedures to draw students’ attention to print (Dorry & Zeaman, 1973; Walsh & Lamberts, 1979). Another alternative that may fit more easily within the context of inclusive classrooms is matching tasks. There are some studies in the literature that suggest matching tasks may be as effective as fading procedures (Eikeseth & Jahr, 2001; McGee, Krantz, & McClannahan, 1986; Raver & Dwyer, 1986). Matching activities are particularly useful when working with students who do not have expressive verbal skills; by matching PCS to text, these students are able to demonstrate their word reading abilities.

Velcro® Books. Velcro® books can be easily made by laminating books and attaching PCS with Velcro® or by attaching Velcro® and PCS to board books. Students match PCS to text in the books, using illustrations as context clues, similar to the way typically learning children use context clues to ‘read’ word and picture books.
Cut and paste tasks or activities where students draw lines between corresponding PCS and text can also support students in matching photographs or PCS to single words. Concentration-type games can be used with text cards and PCS cards, whereby students find text to PCS matches.

**Additional word identification activities.** Numerous classroom activities can be adapted to enhance word-learning opportunities for students with developmental disabilities. Individual dictionaries can be designed to include space for PCS, photographs or illustrations. Word walls, often used for daily word study, can be adapted with the addition of PCS. As well as supporting students with more significant developmental disabilities, visual supports can assist those with mild intellectual disabilities, learning disabilities, and English as a Second Language.

**Visual Strategies for Developing Comprehension Skills**

In addition to developing word recognition skills, it is important to teach students with developmental disabilities to comprehend text for meaningful purposes. Often, students will learn to read many individual words but will not be able to comprehend a message using words they can recognize individually. Students must be taught to ‘see the picture’ when reading phrases or sentences; they must be taught to read for meaning. Many of the activities used to teach individual word recognition can be expanded to enhance reading comprehension skills.

**Matching activities.** As for the development of word identification skills, matching activities can assist not only in the development of comprehension skills but also in developing comprehension skills. PCS sentence strips can be matched to text sentences, both with and without associated illustrations, to demonstrate comprehension. Matching can occur through the use of Velcro® books, cut and paste activities, or draw-a-line activities.

**Illustrating text.** For students with the ability to draw, text can be presented without illustrations, leaving a space for the student to draw a representational picture. For students unable to draw, they can be provided with pre-drawn illustrations to match to text.

**Cloze activities.** PCS grids can be used to support students in filling in blanks in sentences to encourage reading comprehension. Sentences such as “The bird can _______” can be presented along with a set of words such as ‘swim’, ‘fly’, and ‘cook’. Selection of the appropriate word demonstrates reading comprehension, along with a conceptual understanding of what birds can do. Those with independent printing or writing skills can be expected to write the word in the blank, while those unable to do so can cut and paste the PCS to fill in the blank.

**Organizational Maps.** Organizational maps, commonly used throughout the school day for a variety of academic subjects, can support the development of comprehension skills as well as provide students with a means of acquiring and demonstrating knowledge. Maps for comparing and contrasting, sorting and classifying, or showing story sequences can be developed and adapted with PCS or student illustrations. PCS can be cut and pasted into the appropriate locations of an
organizational map. Colour coding of maps supports students who may not have the requisite background knowledge to complete the task independently.

Strategies to Support Writing

Students with developmental disabilities may require support with a variety of components of the writing task. They may need support in spelling words correctly. The use of text-labeled PCS or PCS dictionaries is a simple solution to difficulty with independent spelling. Students can be taught to refer to the labels on PCS to find the spellings for words. As well, students may experience difficulty in ordering words correctly to form a phrase or sentence. There are several ways of using PCS to support students in organizing words into phrases and sentences with minimal adult assistance.

Writing boards. Writing boards can be constructed to house grammatically colour-coded PCS, attached with Velcro®. Students can be provided with colour-coded writing forms and, by selecting similarly coloured PCS, can construct simple sentences. PCS can also be placed on index cards that can be manipulated to create sentences.

Word wall. The classroom word wall can be grammatically colour-coded to support student writing. As with writing folders, students can be provided with colour-coded writing forms to encourage the construction of simple sentences. The use of highlighters provides a quick and easy way of colour-coding paper in preparation for writing exercises.

Technology supports.
Software such as Writing with Symbols 2000 (Mayer-Johnson, 2000) and Intellitalk II (Intellitools, 2000) can be used in conjunction with an adapted keyboard. Intellikeys (Intellikeys, 2000) to support independent writing. Alphabet overlays can be placed on the Intellikeys keyboard for those able to spell independently, or custom-made PCS overlays can be designed using the software, Overlay Maker (Intellitools, 2002) for those who are able to combine PCS to create sentences but are not independent spellers. By touching PCS on the overlay, whole words appear on the computer screen. Overlay Maker allows teachers to prepare a variety of overlays for writing exercises as well as other activities. Figure 5 shows an overlay for writing a poem about Thanksgiving. For each sentence, the student is expected to touch the PCS labeled ‘Thanksgiving is’ and then select one of the choices below.
Responding to Text with Organizational Maps

Due to expressive language challenges, students with developmental disabilities may experience difficulty in discussing aspects of text such as characterization, plot, problem and solution. General communication supports such as communication boards and grids can support students in joining the class for discussion on particular aspects of text. In addition, the use of organizational maps can assist students in expressing their understanding of texts.

Depending on individual students’ abilities, organizational maps can be designed to allow entirely independent completion or can support students in demonstrating their understanding of text by selecting PCS from a set. Students can work with peers, who can assist with some aspects of filling out a map, such as completing the illustrations on index cards, while the student with a disability sorts the illustrations and places them in the correct portions of the map.

Character maps. Character maps can be used in conjunction with PCS grids to support students in describing characters in terms of their feelings, actions, etc. Students can cut and paste PCS into categories to demonstrate their understanding of a particular character. Colour coding of map components and PCS choices can assist students who may not be able to complete the task independently. Students can also draw to demonstrate their understanding of a character’s motivation.

Plot summaries. Plot summary grids can be used to support students in summarizing information regarding characters, plot, problem and solution in a story by either illustrating or pasting pre-drawn illustrations into the correct sections. PCS grids can be used to support students in selecting the correct words to place in the setting and character portions of the map. Illustrations showing the plot can be cut out and randomized, providing students the opportunity to demonstrate their understanding of the plot by sequencing the illustrations correctly. PCS grids of possible problems and solutions can be presented and students can select one to place in the plot summary grid, based on their understanding of the text. Plot summary grids can be particularly useful in...
supporting high school aged students dealing with high-level texts as they focus on the salient features of the text (Fossett, Smith, & Mirenda, 2002).

Visual support strategies can result in increased inclusion in literacy learning activities and influence the development of word recognition, comprehension, and writing skills, as well as the ability to respond to text. When provided with supports that allow for increased understanding of literacy instruction and provide alternate means for the demonstration of skills, abilities, and knowledge, students with developmental disabilities not only benefit but also are better able to contribute to the literacy classroom. The provision of meaningful and motivating literacy instruction not only supports the inclusion of children with developmental disabilities within the literacy classroom but also develops important literacy skills that will further support the development of communication skills, access to educational and employment opportunities, and access to community-related activities.

References


