Enhancing Emergent Literacy Skills with SMART Board Interactive Whiteboard Technology

Jennifer Clark, Early Childhood Special Education Teacher

Philip Nordness, Ph.D., University of Nebraska-Omaha

MacArthur Early Childhood Center

235 West Grant, Macomb, IL 61455

E-mail: clarkj@mcusd185.org

Enhancing Emergent Literacy Skills with SMART Board Interactive Whiteboard Technology

Concepts related to emergent literacy form the basis for later reading and writing. When preschoolers point and recognize pictures in a book or on a computer screen and pretend to read a story, they are performing behaviors associated with the emergence of early literacy. Emergent literacy stresses that written and oral languages develop concurrently and interrelatedly from birth and that they are best learned when children have opportunities to observe and interact with others who read and write. Some basic emergent literacy concepts include: using pictures and words to communicate, pictures have meaning, we read words from left to right, each word we say can be written down, using one or more letters of the alphabet, and stories have a sequence. Unfortunately young children with oral language delays and impairments have significant literacy problems before they reach the first grade (Scarborough & Dobrich, 1990). Those young children who fail to develop basic literacy skills early in life continue to fall behind in kindergarten and the primary grades and are likely to end up repeating a grade or being assigned to a transition class (Strickland, 1990).

Coordinating appropriate literacy activities with current computer hardware and interactive software is an exciting opportunity for engaging children in activity-based learning, because it relates to emergent literacy for children with disabilities. Studies that have used interactive technology to teach emergent literacy skills have reported positive results and marked improvements in pretend "reading" and story sequencing (Hutinger, Bell, Daytner, & Johanson, 2005). One type of interactive technology that can be used to teach emergent literacy skills is a SMART Board™ interactive whiteboard. The SMART

Board interactive whiteboard is a touch-sensitive display that is connected to a computer and digital projector. The computer applications are then directly controlled from the touch screen. So instead of using a computer mouse to draw a letter, a child may come up to the interactive screen and use their finger to draw a letter of the alphabet. Similarly, instead of using a mouse to identify, click and drag items a person would wear in the rain, a child may now come up to the interactive whiteboard and use their finger to point and drag the items. This type of gross motor interaction with technology serves as a precursor for the fine motor skills necessary for the fine motor development used to conduct smaller movements, such as those used in penmanship and laptop computer use.

Purpose

Given the encouraging findings from previous research on the use of technology for teaching emergent literacy skills, we conducted a six-month action-based research project to examine the effect of teaching emergent literacy skills, using a SMART Board interactive whiteboard, to a group of early childhood students with disabilities, at MacArthur Early Childhood Center in Macomb, IL. We specifically used the SMART Board interactive whiteboard for instruction related to picture naming, spacial relationships, and rhyming. In addition, we examined student time on-task behavior during instruction with the SMART Board interactive whiteboard.

Research Design

To determine if a SMART Board interactive whiteboard can enhance emergent literacy instruction, we used a control group of 10 early childhood students with disabilities, who received traditional instruction on emergent literacy skills, including the use of a chalkboard, pictures, and printed text. In addition to the control group, we had an experimental group of 10 early childhood students with disabilities who received emergent literacy instruction with the SMART Board interactive whiteboard and its interactive software for instruction. Through attrition during the semester, we lost one student in each group, so each group ended up with nine students. Through demonstration and instruction, the students interacted with the technology by coming up to the whiteboard and demonstrating skills as they relate to emergent literacy. The control group of 9 students attended literacy class in the afternoon and the experimental group of 9 students attended literacy class in the morning. Literacy instruction for both groups occurred daily for 30 minutes.

We used Batelle Developmental Inventory (BDI) at the intake and completion phases of the study, to measure the effect on student learning. We used the BDI subscales for Conceptual Development, Attention and Memory, and Reasoning & Academic Skills. The items for Conceptual Development measure the child's ability to grasp concepts and draw relationships among objects. For example, the child makes comparisons among objects based on physical features such as color, shape, and size. In addition, this subscale measures the child's ability to group and sort objects according to their similarities and differences. The Attention and Memory subscale measures the child's ability to respond to stimuli and to retrieve information when given relevant cues to do so. The Reasoning and Academic subscale assess the child's ability to use critical thinking skills that are needed to perceive, identify, and solve problems. This subscale also measures the skills needed for high achievement in school, such as reading, writing, spelling, and mathematics.

In addition to measuring students' performances on academic tasks, we also measured time-on-task behavior through an observation technique known as "momentary time sampling". During momentary time sampling, students' attention to the task at hand was assessed at the end of timed intervals, once every 30 seconds for a 15-minute period. Students' on-task behavior was assessed once a week for 18 weeks.

Results

The students who received literacy instruction with the SMART Board interactive whiteboard displayed on-task behavior 81% of the time during a one-half hour instructional period, whereas the students who received traditional literacy instruction, without the SMART Board interactive whiteboard, displayed on-task behavior 58% of the time.

To determine the effect of the SMART Board interactive whiteboard, we computed effect sizes for each group using BDI. Effect sizes are computed to produce a quantitative index of the effect of an intervention. In its most simple terms, effect sizes are computed by subtracting the mean score from the pretest, from the mean score of the posttest and then dividing by the mean standard deviation from pretest (Glass, McGaw, & Smith, 1981). Effect size correlations are generally defined as "small, d =.2," "medium, d = .5," and "large, d = .8" (Cohen, 1988). It is our hope that students who receive instruction with the SMART Board interactive whiteboard will demonstrate effect size correlations of .5 or higher. The benefit of computing effect sizes is that, unlike significance tests, effect sizes can be computed regardless of sample size and have been used frequently in behavioral sciences (Cohen, 1992; Trout Epstein, Mickelson, Nelson, & Lewis, 2003). The effect size results from our study are listed in Table 1.

Table 1. Effect Size Correlations

Batelle Subscale	Experimental Group	Control Group
Concepts	.123	.042
Memory	.080	.031
Reasoning	.052	.032

Unfortunately, we did not demonstrate significant gains in student performance when we used BDI as our measurement device. This was somewhat surprising, given the increased time-on-task performance of the students in the experimental group and teacher observations of improved student performance. One problem may be that BDI is not sensitive enough to measure some of the small gains that students had made over the course of six months. Another concern was that some of the students were displaying difficult behaviors on the day of testing, and that may have also had an effect on student performance. If we would have had additional resources tracking student progress with curriculum-based measurements, we may have had a more accurate and detailed description of student performance.

Future Research

Although our results were not as impressive as we had hoped, there was ample evidence to support additional research on using the SMART Board interactive whiteboard for instruction with early childhood students with disabilities. First, our results from the time-on-task data support the use of the SMART Board interactive whiteboard for helping students attend to stimuli in a meaningful manner. This is significant when you consider the attention issues many students with disabilities have in early development. Second, we noticed the SMART Board interactive whiteboard really helped to facilitate learning for a couple of the students who had visual impairments. Future research should examine the impact of using a SMART Board interactive whiteboard for instruction with students who have visual difficulties. Thirdly, we noticed that the SMART Board interactive whiteboard was an effective tool for teaching students gross motor movements for letter formation and numbering. As the students mastered the skills from a gross motor level, the teacher then moved to a more fine motor approach. Finally, future research should conduct additional experimental studies on the early childhood special education population using curriculum-based measurements which will be more sensitive to students gains in performance.