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ABSTRACT

The purpose of my research project was to involve students in interactive activities using the ActivBoard in order to guide practices that may lead to increased reading skills. My research project involved an ActivBoard group and a control group. Each group consisted of twenty second grade students in separate classes but taught at the same elementary school. The ActivBoard group engaged in active learning using guided practices incorporating the ActivBoard into the reading curriculum. Each group completed four pre- and posttest reading quizzes, two CRCT reading tests, and two STEEP reading fluency tests. I conducted this study over a two month period. The results of my research project are inconclusive. While the ActivBoard group showed sharp improvement between the pre- and posttests, the control group also showed moderate improvement. It should also be noted that my sample size is small and may not allow the level of statistical power necessary to detect differences between the treatment group and control group in any of the quizzes and especially in the standardized tests. Further research with larger sample sizes is required in order to make more definitive conclusions on the effects of the ActivBoard on students' reading performance.

INTRODUCTION

One of the goals of the No Child Left Behind act is to integrate technology into instruction to potentially improve student achievement (Schut, 2007, p.17). Another imperative goal is that students build a solid foundation in the area of reading. "Reading is fundamental to success in life. It's that simple. Reading opens the door to virtually all other learning. Basically, you have to be able to read to succeed. Poor literacy leads to unemployment, poverty, and crime" (Zimmerman & Hutchins, 2003, p.4). The importance of early reading should not be underestimated because children who struggle with reading in early grades tend to fall behind their peers throughout the school years and their academic achievement in other content areas also suffers (McIntyre, Petrosko, Jones, Powell, Powers, Newsome, & Bright, 2005).

I feel it imperative for students to be exposed to as many techniques as

possible to encourage them to read. Students often become unmotivated to read unless reading is presented in ways other than using the basal reader. Reading needs to become an exciting part of students' early learning. As a teacher, I need to present reading skills in a way that is both challenging and motivating. I find that the ActivBoard motivates my students to learn. They become actively engaged in learning. Many countries such as Mexico, China, and the United Kingdom are incorporating interactive whiteboards (or ActivBoards) into their instruction. "The U.S. needs to provide whiteboard technology in order to have our students compete in a global economy" (Starkman, 2006, p.2). With the implementation of more interactive whiteboards, I feel the classroom will become part of the technology wave.

LITERATURE REVIEW

Instruction Using Basal Readers

I observe that students often become bored with the regular reading program and become apathetic to reading. Using a basal reader as the only form of reading is not motivating to some students, but it is still the dominant means of reading instruction in the United States. Tyner (2004) argues that basal readers must be used flexibly in order for them to be effective and that when basal readers are used as the means for the total reading program, they often become less effective. In other words, basal readers were never meant to be used as the instrumental materials for a complete reading program, but only as a starting point (Tyner, 2004). Similarly, textbooks are used to supplement lectures and to strengthen learners' conceptual understanding and knowledge. Therefore, classroom instruction is often centered on textbooks (Mott, Benus, & Neal, 2007). However, research suggests that effective teachers exercise varying techniques and strategies to maximize each student's potential (Stronge, 2007). Research also suggests that students whose teachers constantly develop and integrate inquiry-based problem-solving, hands-on activities, and evaluation methods assessing critical thinking skills consistently outperform their peers whose teachers rely solely on textbook-based materials (Stronge, 2007). Hoff (2003) once argued, "We do our kids a disservice by choosing one pedagogy and using it all the time" (p.8).

Incorporation of Technology

An ActivBoard is best described as "a one giant computer screen that the teacher can manipulate with a variety of tools, enabling them to present slides, take notes, and do a host of other things (Villano, 2006, p.2). It can be used in conjunction with a variety of visual and audio tools to enrich students' learning experiences. The ActivBoard can be a valuable medium for students to

learn new materials.

First, the ActivBoard can be used together with graphic organizers, which are tools that students may use to help organize and remember key ideas. Graphic organizers help students memorize key concepts because they serve as blueprints or maps that translate abstract ideas into more visible and concrete information (Burke, 2005). There is no doubt that visual learners will directly benefit from using graphic organizers. Research shows that kinesthetic learners may also benefit from completing graphic organizers through drawing and moving around (Marzano, Pickering, & Pollack, 2001). When graphic organizers are used in the reading curriculum, they can assist students in retaining information that is presented on an ActivBoard.

In addition, through the use of an ActivBoard, students are also allowed to listen to their reading using an audio CD. These CDs seem to motivate students to follow along while listening to the text. Common wisdom tells us that hearing text read aloud improves students' reading ability (Holum & Gahala, 2001). With the ActivBoard, children can either listen to the audio version of a book while following along silently with the text version or they can practice reading the text aloud while listening to the audio version. In summation, the ActivBoard is a flexible tool that can be used along with other forms of technology to improve reading skills and may potentially be helpful for students with different learning styles.

Use of Technology and Active Learning

Many schools are investing in a variety of forms of technology in order to prepare students for the future. Classrooms at every level are changing as technology is incorporated into the curriculum. Technology is often seen as a vehicle for meeting the diverse needs of students by providing them with enriched learning opportunities (Rakes, Fields, & Cox, 2006). Villano (2006) states:

> Among the old-school resources that the digital age is making obsolete or at least less consequential, count the chalkboard. For decades, the chalkboard was the focal point of all instruction, the big screen on which teachers wrote out and directed lesson after lesson after lesson. Today while chalkboards still exist, they are losing their status as the classroom centerpiece – districts are now investing in technology to modernize classroom displays. (p.1)

As its name suggests, an ActivBoard (or interactive whiteboard) facilitates active learning. When the ActivBoard is used, students exhibit enthusiasm and a desire to gain knowledge. "The most powerful aid to understanding is active involvement" (Tate, 2005, p.xiv). Today's learners are expected to synthesize and apply knowledge regularly; passive learning, therefore, cannot meet the

demands put on the learner (Brown, 2004). In keeping with the constructivist learning theory, communication and visualization tools such as the ActivBoard help create an active learning environment in which collaboration and interactions among learners occur frequently in socio-cultural contexts (Rakes et al., 2006). The findings of a study on ActivBoard by Wall, Higgins, and Smith (2005) reveal that the ActivBoard is effective in improving learning quality by reinforcing concentration and attention and in motivating classroom participation through a combination of color and movement. The same study also found that the use of ActivBoard may influence pupils' views of learning toward seeing learning as a more visual and verbal-social process. Hall and Higgins (2005) attributed students' positive views toward the ActivBoard to its versatility "that they are a conglomeration of all previous educational technologies, that is, chalkboard, plain whiteboard, television, video, overhead projector and personal computer but with the added advantage of being able to interact with various elements of these media (p.106).

METHOD

Participants and Setting

The study included forty second grade students from two different classes within the same elementary school. This elementary school houses kindergarten through third grade students. There are approximately 1,500 students with 125 instructional staff members. The school's ethnic demographics consist of 34% black, 62% white and 4% other nationalities. Demographic data for the school area shows that 35% of the households are single-parent homes and 5% of the citizens live below the poverty level. Thirty-three percent of the poverty population is white and 62% of the poverty population is black. The school system provides 60% of its students with free or reduced lunches. Students are grouped heterogeneously in classes in each grade level. The two classes that were chosen to participate have a similar class make-up. Each class had twenty students that participated in the study. These students' level of academic achievement is representative of that for the whole school, and only one student out of forty did not pass the Criterion-Referenced Competency Test (CRCT) the previous school year. The school is designated as a Title I School. Title I funds have made it possible to provide substantial technology resources. All classrooms have an ActivBoard, a DocCam (document scanning device used in education much like an overhead projector), at least three multi-media computers, a computer for the instructor, and a DVD/VCR player.

Instrumentation

The control group and the ActivBoard group were evaluated using four in-class quizzes and two standardized tests. The in-class quizzes were based on stories taken from the Open Court Reading Series. Each in-class quiz consisted of sixteen questions. Five of the questions involved vocabulary presented in the story, and the other nine involved comprehension questions based on the story. The standardized tests involved in this study were the Georgia Criterion-Referenced Competency Test (CRCT) Benchmark and System to Enhance Educational Performance (STEEP). Only the reading sections of each of the standardized tests were used for the evaluation in this study.

Research Procedures

Permission to begin this study was given by the Georgia College & State University Institutional Review Board (IRB) and the school principal. A letter of explanation and a permission slip were sent to the parents of each of the student participants. Research began when all forms had been returned. The students were given the CRCT reading benchmark and the STEEP test before giving the first in-class quiz. Each class was given a pretest over the story "Fossils Tell of Long Ago." At the completion of the pretest, the control group orally read and discussed the reading story. After the completion of the discussion, students were given a posttest over the story. The ActivBoard group was given the same pretest. Students then participated in the following activities involving technology: the students viewed and listened to the same story as the control group via the ActivBoard using an audio CD. The students then completed a graphic organizer (Appendix A) on the details and elements of the story using the ActivBoard. The next activity involved vocabulary (Appendix B) in which the students actively participated in using the ActivBoard. Students orally discussed the author's purpose. Upon the completion of these activities, the students were given the same posttest as the control group. These activities continued for four consecutive weeks during which students read and were tested on a total of four stories. On the fifth week and after the completion of the fourth posttest, students were given the same CRCT reading benchmark and the same STEEP reading test. The results of these tests were recorded and evaluated to determine if ActivBoard activities increased reading achievement.

Data Source and Analysis

Data sources included CRCT Benchmark Tests, STEEP, and pre- and post-instructor-designed reading quizzes. Benchmarks were developed using content CRCT standards and provided the "framework for teaching and assessing key concepts because they are more specific and concrete than most standards"

(Burke, 2005, p.6). STEEP is a research-based response to any intervention program that guides users to match an appropriate intervention to the needs of struggling learners. STEEP uses a standard protocol approach to quickly identify the type of intervention needed in reading or math for students not achieving benchmarks (STEEP, 2007). These quantitative data were subjected to inferential statistical analysis, in particular, multivariate and univariate analysis of variances.

RESULTS

Tables 1 and 2 display the descriptive statistics for the four in-class quizzes and two standardized tests (Benchmark CRCT and STEEP) by treatment group and time of the test. For both the ActivBoard group and the control group, the posttest scores were significantly higher than the pretest scores. The disparity between the pretest and posttest scores was especially large for the ActivBoard group on the four quizzes. The reason for the disparity in the pretest scores between these two groups is unknown but could possibly be attributed to the fact that my class was more comfortable with my way of grading and realized that I would not include the pretest scores into their final reading score. On the other hand, the control group was not familiar with my grading techniques. Even though their teacher stated that the pretest scores would not be included in their final grade, the students in the control group could have been more anxious about my grading techniques and their overall grade. The students in the ActivBoard group also scored much higher than the control group students on the posttests of the four quizzes. However, the posttest scores for the ActivBoard group were also much more spread out than those for the control group. Students in the ActivBoard and control groups scored more similarly on the pretest of Benchmark CRCT and STEEP. The ActivBoard group scored higher than the control group on both the pretest and the posttest of Benchmark CRCT. The ActivBoard group scored slightly lower than the control group on the pretest of STEEP, but they scored somewhat higher than the control group on the posttest of STEEP.

Two mixed two-way (2*2) MANOVAs were performed in order to compare the pretest and posttest means in any of the quizzes and standardized tests between the students in the ActivBoard group and the control group. The between-subject variable in this case has two levels: treatment condition and control condition. The within-subject variable also has two levels: pretest and posttest. Tables 3 and 4 summarize the overall MANOVA results using Wilks' Lambda. The MANOVA analyses indicate that there was a statistically significant difference between the pretest and posttest scores for both the four quizzes ($\lambda = 0.25$, $F = 56.19$, $df = (4, 35)$, $p = <0.001$) and

the two standardized tests ($\lambda = 0.87$, $F = 5.53$, df $= (4, 35)$, $p = 0.01$). The same MANOVA analyses also show that there was a statistically significant difference between the ActiveBoard group and the control group on the posttest of the four quizzes ($\lambda = 0.63$, $F = 10.82$, df $= (4, 35)$, $p = <0.001$). Students in these two groups, however, did not perform significantly different on the posttest of the two standardized tests ($\lambda = 0.93$, $F = 2.80$, df $= (4, 35)$, $p = 0.07$).

Seven two-way ANOVAs for the scores of each of the quizzes and standardized tests were also conducted. Since a total of seven null hypotheses were tested in this single analysis, a more conservative statistically significance level of .01 was used rather than the conventional critical level of .05. Tables 5 and 6 summarize the results of the ANOVA analyses. The two-way ANOVAs again show that there was a statistically significant difference between the scores on the pretest and posttest for all the four quizzes and on both standardized tests. However, statistically significant difference between the ActivBoard group and control group was only found in the quiz after the story "Hope" ($F = 24.55$, df $= (1, 38)$, $p < .001$). In other words, students in the ActivBoard group did not perform significantly better than the students in the control group on all the three remaining quizzes, nor on the two standardized tests. I also found a statistically significant interaction effect between the treatment condition and occasions of the test for all the four in-class quizzes. This interaction effect can be explained by the disparity in the improvement rates between the ActivBoard group and the control group on the four quizzes. In other words, students in the ActivBoard group made sharp improvement from the pretest to the posttest, whereas the students in the control group made relatively moderate degree of improvement.

Additional ANOVA analyses incorporating the two demographic variables were conducted. No statistically significant difference was found between the performance of male and female students or the Caucasian students and the African American students. There were also no interaction effects between the treatment condition and either of these two demographic variables on all the four quizzes and both standardized tests. The results of these ANOVA analyses were omitted from this final report.

DISCUSSION

The purpose of this research project was to guide practices using ActivBoard that may lead to an improvement in reading skills. I conducted this study over a two month period. The results of my research project were inconclusive. While the ActivBoard group showed sharp improvement between the pre- and posttest, the control group also showed moderate improvement.

The ActivBoard group scored higher than the control group on both the pretest and posttest of Benchmark CRCT but slightly lower than the control group on the pretest of the STEEP. The ActivBoard group scored somewhat higher than the control group on the posttest of the STEEP. Evaluating true comparisons of the two groups were very difficult when you are not in control of both groups. Each group had different teachers with different teaching methods which posed a threat to the outcome of this study. I feel the test scores on the pretest in the ActivBoard group were much lower since my students realized that these tests would not be incorporated into their final grades. The control group was given the same information but I feel that their teacher placed more emphasis on achieving a higher grade on the pretest. The classroom teacher of the control group was instructed not to have students participate in ActivBoard activities during this research. The students in control group did not participate in ActivBoard activities between the pre and post reading tests. However, the control group students did participate in some ActivBoard activities beyond the timeframe of this research. Also, there were limitations involved in the sample size of my study. My study only involved two classrooms of twenty students each. This sample size is too small and may not allow the level of statistical power to detect differences between the treatment group and control group in any of the quizzes and especially in the standardized tests. Further research with larger sample sizes is needed in order to make more definitive conclusions on the effects of ActivBoard on students' reading performance.

The students that were involved with the ActivBoard activities did show a larger improvement in reading on the posttest. I feel the activities involving graphic organizers were helpful for the visual and kinesthetic learners in my class. The organization of story elements and vocabulary activities appeared to help the students retain information needed for the completion of the weekly posttest (Burke, 2005). Students appeared to pay closer attention to the story when an audio CD was used compared to oral reading of the basal. I feel my ActivBoard group benefited from hearing the story on CD which might have had a positive effect on reading scores on the posttest (Holum & Gahala, 2001). When my students were engaged in ActivBoard activities, the enthusiasm of the students was high. Students that were involved in the ActivBoard activities seemed to be more motivated as compared to those in the control group (Hall & Higgins, 2005). Larger studies will need to be done in order to examine students' attitudes toward ActivBoard use (Wall, Higgins, & Smith, 2005). Qualitative research methods may also help us gain further insights about the effects of ActivBoard on students' attitudes toward reading or toward learning in general. These potential psychological and emotional impacts of ActivBoard on student learning are crucial and should be examined along with students'

test scores.

For future studies, I feel a longer time span should be used. Two months was probably not a sufficient period of time to see real improvement. Also, this research should not be limited to one grade level. ActivBoard is a relatively new technological innovation, so more research studies need to be conducted to test its effect. This study was promising in that both groups improved in the reading scores. I feel students would benefit from more research studies on the effects of ActivBoard (Schut, 2007).

APPENDIX AND FIGURES

Table 1: Means and Standard Deviations for the Four Quizzes by Treatment Group and Time of the Test

		Fossils Tell of Long Ago		Butterfly Seeds		Statue of Liberty		New Hope	
Time of the Test	n	M	SD	M	SD	M	SD	M	SD
Experimental Group									
Pretest	20	13.85	13.10	19.15	11.33	20.10	11.96	16.15	8.66
Posttest	20	79.35	22.60	84.40	24.73	82.05	17.26	84.25	17.61
Control Group									
Pretest	20	34.70	24.09	40.30	18.18	30.05	17.81	27.95	12.39
Posttest	20	40.90	22.18	50.10	18.08	54.10	16.44	37.90	12.67

Note. The score range for all the four quizzes from 0 to 10

Table 2: Means and Standard Deviations for the Benchmark Test and STEEP by Treatment Group and Time of the Test

		Benchmark CRCT		STEEP	
Time of the Test	n	M	SD	M	SD
Experimental Group					
Pretest	20	80.50	11.80	101.80	33.35
Posttest	20	88.25	10.55	124.35	38.44
Control Group					
Pretest	20	72.50	16.02	105.30	38.16
Posttest	20	84.50	13.85	118.40	36.34

Note. The score range for Benchmark CRCT is 0-100; the score range for STEEP is 0 – 275.

Table 3: Summary of Mixed MANOVA Results of the Four Quizzes by Treatment Group (Between-Subject) and Time of the Test (Within-Subject) (n=40)

Source	Wilks' Lambda	F	df1	df2	p
Treatment	0.63	10.82	4	35	<.001
Test	0.25	56.19	4	35	<.001
Interaction	0.43	23.99	4	35	<.001

Table 4: Summary of Mixed MANOVA Results of the CRCT Benchmark and STEEP by Treatment Group (Between-Subject) and Time of the Test (Within-Subject) (n=40)

Source	Wilks' Lambda	F	df1	df2	p
Treatment	0.93	2.80	4	35	.07
Test	0.87	5.53	4	35	.01
Interaction	0.97	1.04	4	35	.36

Table 5: Summary of Mixed Two-Way ANOVA Results of the Four Quizzes by Treatment Group (Between-Subject), and Time of the Test (Within-Subject) (n=40)

Variable	Source	df	F	p
Fossil	Test	1	112.65	<.001
	Treatment	1	2.39	=.131
	Interaction	1	77.05	<.001
Butterfly Seeds	Test	1	117.03	<.001
	Treatment	1	1.89	=.178
	Interaction	1	63.88	<.001
Statue of Liberty	Test	1	286.85	<.001
	Treatment	1	4.20	=.047
	Interaction	1	55.71	<.001
Hope	Test	1	283.31	<.001
	Treatment	1	24.55	<.001
	Interaction	1	157.26	<.001

Table 6: Summary of Mixed Two-Way ANOVA Results of the CRCT Benchmark and STEEP by Treatment Group (Between-Subject), and Time of the Test (Within-Subject) (n=40)

Variable	Source	df	F	p
CRCT Benchmark	Test	1	24.53	<.001
	Treatment	1	2.52	0.063
	Interaction	1	1.14	0.029
STEEP	Test	1	60.06	<.001
	Treatment	1	0.01	.915
	Interaction	1	4.22	.047

Appendix A: Graphic Organizer (used with each story on the ActivBoard)

Main Idea

Appendix B: Vocabulary Activity (an activity for each story was completed on the ActivBoard) for "Fossils Tell of Long Ago"

Drag and Drop the vocabulary word that completes each sentence:

1. The sap hardened and became a fossil called _____.
   My mother has a necklace made of a stone called _____.

2. The fish became a _____.
   The boys found a _____ of a leaf buried in their yard.

3. They have all died out. We say they are _____.
   Dinosaurs no longer live on the earth. They are _____.

4. It dropped into the swampy forest soil which is call _____.
   _____, or swampy forest soil, contains many treasures for scientists.

5. The ancient _____was a kind of elephant.
   We saw the skeleton of a _____at the museum.

   amber fossil extinct peat mammoth
   amber fossil extinct peat mammoth

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