Assisted Technology in the Mathematics Classroom

Does the Classworks program increase standardized test scores?

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**Introduction**

**Orientation**

 According to the Georgia Department of Education (2013), the Criterion-Referenced Competency Test (CRCT) was created to determine how students comprehend and apply grade-level state standards related to the academic content areas. The state of Georgia requires that all students in grades three through eight take the CRCT in certain academic content areas. In the academic content areas of mathematics and reading, all students in all grades are required to take both sections of the assessments and must pass both of these portions with an 800 to be promoted to the fourth, sixth, and ninth grade.

In the Colquitt County School district, middle school students are placed in classes based on their CRCT scores from the previous year. Students who scored an 810 or below on the math portion of the CRCT are placed in a math support class. The math support class is taught during a connections class. The connections classes are taught on block schedule. The blocks are one hour and twenty minutes long and taught every other day based on the odd or even number of the school day. The classes have a mixture of regular and special education students and many of the students are taught in a co-teaching setting in their academic math class. In the math support classes, the students are taught by a certified teacher. The teacher provides support based on the Common Core Georgia Performance Standards (CCGPS). During the class, the students are offered remediation through teaching and a computer-assisted technology program. The computer-assisted technology program used at Williams Middle School is called Classworks.

**Purpose Statement**

The purpose of this research is to determine if co-taught seventh-grade students who complete Classworks in a math support class score higher on the math portion of the CRCT in comparison to seventh-grade co-taught students not in a math support class.

**Research Questions:**

1. Do co-taught seventh grade students who complete Classworks in math support class score higher on the math portion of the CRCT than co-taught seventh grade students who are not enrolled in math support class?
2. What are students’ perceptions of the Classworks program?

**Importance of the Study**

 This research study will provide statistical proof between the uses of assisted technology programs, like Classworks, and how well students perform on standardized tests. From this study, the school will be provided statistical data that shows if there is a difference in standardized test math scores of co-taught students currently in math skills class, using Classworks and co-taught students who are not in a math skills class. During my research, the Classworks program was not used in any of the studies from the literature. This study will allow literature to be written on this program to fill the gap in the literature.

**Definition of Terms**

According to Dictionary.com (2013), computer-aided instruction, also known as computer-assisted instruction, is “the use of computers for education or training.” Based on the definition provided by Classworks Curriculum Advantage Inc. (2013), Classworks is a “web- based curriculum resource in mathematics, reading, language arts, and elementary science.” Co-teaching is defined, by the Curry School of Education (2012), as ”involving two equally-qualified individuals who may or may not have the same area of expertise jointly delivering instruction to a group of students.”

**Literature Review**

**Literature on Methods of Teaching Math with Assisted Technology Instruction**

According to Taj & Sivalingam (2013), computer assisted instruction allows learners to learn mathematics through the use of the computer acting as a “tutor and tool” (p.2).As the use of computer assisted instruction increases in the classroom; students will enjoy the use of the technology and be able to learn the math concepts on their own. In the study by Taj & Sivalingam (2013), students were divided into two groups to compare the best method for teaching math. The methods compared were computer assisted instruction and the traditional instruction method. During the teaching process, the students were taught the math concept fractions. The students completed a pre-test and post-test and the scores for both groups were compared. The results for this study showed that the average post-test scores were higher for the computer assisted instruction group meaning that students were able to learn the math concept better using the computer program.

In the United States, teachers in all content areas are expected to use several types of technology as they teach in their classroom. According to Frye and Dornisch (2008), technology allows the students to participate in ways of learning content that is interactive and students prefer teachers that teach using technology. Frye and Dornisch (2008) completed a study to determine if teachers were capable of using technology in the classroom and if the technology was used more in math and science classrooms. During the study, a group of 101 high school students from different places in the world were asked to answer a series of questions about themselves, one of their teachers, and give their thoughts on one of their content classes. In the analysis of the study, Frye and Dornisch (2008) stated that 52% of the participants answered the questions about a math or science class and the remaining 48% focused on English or Social Studies. The results concluded that math or science teachers who used technology in their classrooms improved the student’s content knowledge, added motivation, and improved the student’s outlook of the subject and teacher.

**Literature on Use of Assisted Technology Instruction in Math Classrooms**

In the study by Leh and Jitendra (2012), a group of 25 third-graders were selected to participate in an additional mathematics course that focused on solving word problems. The students were selected based on their state test scores from the previous year. During the study, the students were split into two groups. The students were taught how to solve word problems through computer-mediated instruction and teacher-mediated instruction. Both types of instruction provided students with an explanation of the problem-solving process that needed to be used to solve the word problem. According to Leh and Jitendra (2012), “a review of the two programs revealed that they are more similar than different with regard to instructional practices” (p. 70). The results showed that there was not a significant increase in final results for either type of mediation. The results indicate that neither way of teaching is more effective than the other.

 In the study conducted by Rasanen, Salminen, Wilson, Aunio, & Dehaene (2009), a group of students were selected to participate in a comparison study. Each group was chosen based on their understanding of number skills. According to Rasanen et al. (2009), “many components of cognitive processing have been connected to poor performance in mathematics” (p. 451). During the study, the groups participated in two mathematical games during a three week period. The computer assisted programs concentrated on the math concepts of counting, number sequencing, and comparing an object amount to the written number form. The programs were similar in comparison to the tasks that the students had to perform. Rasanen et al. (2009) stated that the programs differed from each other by how the numbers were compared to each other. After the completion of the study, Rasanen et al. (2009) concluded that the results from each group showed no greater average score for each group. These results indicated that the computer-assisted programs were not affective in meeting the criteria for this type of instruction.

According to Periathiruvadi and Rinn (2012), there are many ways of teaching gifted students in the United States. Periathiruvadi and Rinn (2012) stated that “ technology not only allows teachers to provide differentiated instruction for gifted children and adolescents, but also serves as an educational and creative outlet for some of the best and brightest minds in the world” (p. 153). This article focuses on empirical research that is associated with teachers using technology to teach gifted students. The results from Periathiruvadi and Rinn’s (2012) research showed that gifted students had a better understanding of the content when technology was used in the classroom with an emphasis of learning online.

**Literature on Programs for Assisted Technology Instruction Used in Math Classrooms**

The use of technology in math classrooms allows students the opportunity to learn in many different ways. Teachers are able to provide more activities and opportunities for the students to learn. According to Meletiou-Mavrotheris and Mavrotheris (2012), the use of “computer games are a tool for supporting mathematics teaching and learning” (p. 455). During this study, a group of 13 students during their final year of college were selected to complete a unit on learning mathematics through game-enhancing. Meletiou-Mavrotheris and Mavrotheris (2012) concluded that the game-enhancing learning did have a positive impact on a teachers’ ability to choose and apply to online game to their instruction.

In the research article by Slavin and Lake (2007), three approaches to teaching math are examined. The approaches focused on are teaching with a text book, using computer-assisted instruction programs, and how a teacher manages a classroom and their practices for instruction. During this study, Slavin and Lake (2007) use a technique called “best-evidence synthesis” (p. 6). This technique “seeks to apply consistent and well-justified standards” that provides information that is appropriate and fair from experimental studies (p. 6). Each study focused on whether each program met the “criteria for inclusion” (p. 7). The “criteria for inclusion” included 6 mandatory guidelines. The results of the study showed that 87 of the studies complete met the criteria for inclusion. Of the 87 studies, classroom management and practices for instruction showed a higher effect on teaching math. The second highest effect was the use of computer-assisted instruction programs and teaching out of text books saw no change in the study.

**Literature on Levels of Achievement when Using Assisted Technology Instruction in Math**

Problem- solving skills are crucial for all levels of students when they are solving word problems. According to Huang, Liu, and Chang (2012), problem-based learning-PBL allows students to learn from their own explorations, collaborate with their peers, motivate their peers to enhance learning, and develop problem-solving skills. Polya’s process for problem solving ( as cited in Huang, Liu, & Chang, 2012) introduced this process as a strategy for PBL. The steps for Polya’s problem-solving method is to understand the problem, develop a plan, carry out the plan, and look back. In the study by Huang, Liu, and Chang (2012), a group of second and third-graders, who showed difficulties in math, were asked to navigate through a computer-assisted program on a website. The program focused on solving addition and subtraction word problems. During the completion of the program, the students were instructed to focus on the four steps for problem solving. The result for the study by Huang, Liu, and Chang (2012), showed that “the computer-assisted mathematical learning system can serve as a supplementary tool that can help teachers with remedial instruction and enhances the problem-solving ability of low achievers” (p.258).

According to Tienken and Maher (2008), “the issue of lower than expected mathematics achievement is a persistent worry to some education leaders and policy makers at all levels of the U.S. PK-12 education system” (p. 1). In this study, students’ state scores from an eighth-grade math class in New Jersey are being compared to determine if there is an increase in achievement. To determine the difference, the students are divided into two groups. The groups include whether the students received computer-assisted instruction- CAI or no CSI during the presentation of the math content standards. The results for this study by Tienken and Maher (2008) showed that there was not a dramatic increase in the test scores for students who participated in CAI.

In this study, Lee, Waxman, Wu, Michko, and Lin (2013) provide an outlook of how students achieve in practices of instruction when technology is present in the teaching and learning. During this study, 58 articles are reviewed to determine if they meet the needed criteria. Lee et al (2013) stated that the three criteria are there is a “focus on teaching and learning with technology in K-12 classrooms,” each group is given a pre and posttest, and each “have reported statistical data that allowed calculations of effect sizes” (p. 135). The conclusion from this study showed that there was an increase in using technology to teach and learn during practices of instruction.

**Methodology Design**

**Overview of Research Design**

This research study will be a quantitative research design and will last for nine weeks. The participants will be from two co-taught math classes of the same teacher and be enrolled in a math skills class that uses Classworks. For the Classworks program, the statistics from the participants will be divided into the domains tested on the CRCT. After the completion of the CRCT, the participants’ scores will be compared to the other co-taught students not in math skills to determine which group performed better on the standardized test.

**Participants**

For this research project, the participants will consist of my current seventh-grade co-taught math students who have math support during connections. The participants are a mixture of 20-25 males and females. The students are from various ethnic backgrounds and many students are from low socioeconomic status. From the participants, several students in their academic classes received services through special education.

**Data Sources/Instrumentation/Procedures**

The project will last for nine weeks. During this nine week period, the data of the participants will be gathered from the Classworks program. The student’s data from the Classworks program will be compared to their CRCT scores. The scores will also be compared to other co-taught students who are not in math support classes. Participates will also share their opinions about the Classworks program through an anonymous survey. The survey will ask a series of questions about the effectiveness of the program. The survey will contain four questions and the participants must state whether they strongly disagree, disagree, agree, or strongly agree.

**Proposed Analysis**

 The quantitative data will be analyzed through the statistical comparison of how the participants performed on the Classworks program compared to the domains of the math CRCT. For the data, the descriptive statistics will be used to analyze the measures of central tendencies of participates’ scores in the Classworks program and other co-taught math students.

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**APPENDIX A**

Student Survey (Anonymous)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1. The Classworks program helps me in my math class.
 |  |  |  |  |
| 1. The Classworks program is going to help me prepare for the math CRCT.
 |  |  |  |  |
| 1. The Classworks program helps me understand concepts I struggle with.
 |  |  |  |  |
| 1. I believe I can excel using the Classworks program.
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