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.

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.

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.

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.

References:

Frye, N & Dornisch, M. ( 2008). Teacher technology use and student evaluations: the moderating role of content area. *J. Educational Technology Systems*, 36 (3), 305-317.

Huang, T., Liu, Y., & Chang, H. (2012). Learning achievement in solving word-based mathematical questions through a computer-assisted learning system. *Educational Technology & Society*, 15(1), 248-259.

Lee, Y., Waxman, H., Wu, J., Michko, G., & Lin, G. (2013). Revisit the effect of teaching and learning with technology. *Educational Technology & Society*, 16(1), 133-146.

Leh, J & Jitendra, A. ( 2012). Effects of Computer-mediated versus teacher-mediated instruction on the mathematical word problem-solving performance of the third-grade students with mathematical difficulties. *Learning Disability Quarterly*, 36 (2), 68-79.

Meletiou-Mavrotheris, M. & Mavrotheris, E. (2012). Game-enhanced mathematics learning for pre-service primary school teachers. *In the Proceedings of the ICICTE*, 455-465.

Periathiruvadi, S. & Rinn, A. (2012). Technology in gifted education: a review of best practices and empirical research. *Journal of Research on Technology in Education*, 45 (2), 153-169.

Rasanen, P., Salminen, J., Wilson, A., Aunio, P., & Dehaene, S. (2009). Computer-assisted invention for children with low numeracy skills. *Cognitive Development*, 24, 450-472.

Slavin, R. & Lake, C. (2007). Effective programs in Elementary mathematics: a best-evidence synthesis. *Best Evidence Encyclopedia*, 1.2, 1-40.

Taj, H & Sivalingam, P. (2013). Effect of computer assisted instruction and traditional instruction method on teaching mathematics. *Indian Streams Research Journal*, 3 (4), 1-4.

Tienken, C. & Maher, J. (2008). The influence of computer-assisted instruction on eighth-grade mathematics achievement. *Research in Middle Level Education Online*, 32(3), 1-13.