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ABSTRACT

This study investigated the effects of using the TI-92+ calculator to demonstrate geometric diagrams to students in class. The participants (N=83) were from three 10th grade classes. A pretest, treatment, posttest with control group design was used in the study. The treatments lasted for 12 weeks. Results from data analyses via the Dependent t-test and the ANCOVA test indicated that for the within-class comparisons, all classes made significant gains in their geometry learning, and no significant differences were found from the between-class comparisons, which indicates that the TI-92+ calculator can be used as an effective demonstration device in geometry instructions. (Contains 29 references.) (Author/MM)

Running head: THE EFFECTS OF USING THE TI92+ CALCULATOR

The Effects of Using the TI92+ Calculator as a Demonstration Device in Geometry Instructions

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Abstract

This study investigated the effects of using the TI92+ calculator to demonstrate geometric diagrams to students in class. The participants (N=83) were from three 10th grade classes. A pretest, treatment, posttest with control group design was used in the study. The treatments lasted for 12 weeks. Results from data analyses via the Dependent t test and the ANCOVA test indicated that for the within-class comparisons, all classes made significant gains in their geometry learning, and no significant differences were found from the between-class comparisons, which indicates that the TI92+ calculator can be used as an effective demonstration device in geometry instructions.

The Effects of Using the TI92+ Calculator

as a Demonstration Device in Geometry Instructions

With the fast advancement of contemporary technology, the inclusion of various types of technology in many aspects of the teaching and learning process has become part of the school culture (Foster & Mueller, 2000), although the use of technology occurs more often in some classrooms than in others. In the past three decades, a variety of calculators have found their ways into all grade levels of schools (District of Columbia, 1992), and have been used by teachers and students for a variety of purposes: for practice problems (Schlaphoff, 1975), as an aid in studying chemistry (Clark, Kuemmerle, & Lieto,1975), for running economic simulations (Addis, 1978), for teaching and learning algebra (Maratta, 1996) and statistics (Austin, 1992), teaching math and science (Marks, 1994; Parker & Widmer, 1992; J. P. Smith, 1998; Vonder Embse, 1997; Waits & Demana, 1989) and so forth. Along with the widespread applications of calculators in classrooms, plenty of research on calculator use in instruction and learning has been conducted over the years, and this area of research has been considerably increased since the late 1980' (Myers, 1998).

The research literature includes studies on various issues related to calculator use in schools. Among the issues addressed in the literature, three are related to student responses to the use of calculators in learning: (1) students' attitude and psychological reactions toward using calculators in their learning; (2) students' achievement in learning the problem-solving skills in math with the use of calculator; (3) students' overall achievement in math learning with the use of calculator.

The first issue has been investigated by a number of researchers. In a study on calculator use in trigonometry course, Spero (1977) found that the use of calculators by students in the trigonometry course increased students' motivation. In Doenges's (1996) study, the confidence level of students who used calculators toward learning pre-calculus was observed to be significantly higher than that of the students who did not. In an investigation on calculator use in algebra course, students who studied algebra with a programmable calculator were found to have less anxiety toward math than those without a calculator, and to have a better self-concept in math than those without the aid of a calculator (Quinn, 1975). Results from Toole's (1979) study indicated that students and teachers perceived the calculator to be most useful for problem-solving. Nevertheless, with the same issue, not all findings reported in the literature were positive. With respect to the impact of calculator use on students' attitude toward mathematics, Castillo (1997) found no significant difference between the experimental and the control group. Similar negative results were reported in Chang (1979), Vazquez (1990), Ward (1978), and Zink (1979).

A number of researchers investigated the effects of using calculators to teach students the problem-solving skills. Focusing on the TI-1200 calculator, Chang (1979) investigated whether the use of the calculator helped 7th and 8th graders improve skills in word problem-solving. She found highly significant difference between the experimental and control groups, in favor of the experimental group. However, in Ward's study (1978), no significant difference in problem-solving achievement was observed between the calculator group and the non-calculator group, between boys and girls; furthermore, the problem-solving achievement of students with reading ability above the class median was significantly better than that of students with reading ability below the class median.

The main body of the literature focused on the impact of calculator use on student overall achievement in math and science learning. This body of literature includes studies with positive and negative findings. The following is a group of studies that reported positive results. When calculators were incorporated to teach 3rd and 4th graders, test results showed that the children understood the number system better after sustained calculator use, and they were better able to choose an appropriate operation in a word problem (Stacey & Groves, 1994). In a study conducted with a science course, Saurino, Bouma and Gunnoe's (1999) conclusion was that incorporating the TI-83 graphing calculators in the course enabled students to complete higher level work with understanding. With respect to the effect of combined use of computers and calculators in trigonometry course, Spero (1977) reported that students increased their achievement in the course. In regard to the effects of graphing calculator use in a college algebra course, Adams (1993) noted that the group mean for students who used calculators only (a type of treatment) was significantly higher than that for students who used calculators and participated in the conceptual change assignment (a type of treatment). As to the effect of the TI-85 calculator use in a college multivariable calculus course, Castillo (1997) observed that the assigned grades for overall performance for the treatment group were significantly higher that those of the control group. In a study with a high school algebra course, Doenges (1996) reported that the algebraic sub-scale scores of students who used graphic calculators were significantly higher than those of the students without using calculators. Similar positive results from a study with a high school pre-calculus course were found by Chandler (1992). Since the treatment with calculators in the Chandler study lasted for only 2 weeks, one might suspect that the effects of the treatment could well be novelty effects.

Apart from the positive findings from the above research reports, negative results were reported in a number of studies. The effects of using the Monroe Classmate 88 calculators in a remedial math program for students in grades 7-12 were investigated by Zink (1979). Based on the results of the study, Zink concluded that no significant differences in the treatments (with calculator or without calculator) were found. In terms of the effects of the calculator-assisted instruction on math achievement, Chang's (1979) report was that no significant difference was found between the treatment and control group in math concepts and computation; the use of calculators did not help 7th graders improve their areas of learning difficulty in math; allowing the use of calculators seemed to have some corrective effect for the 8th grade low achievers in the area of number system and operations; both average and high achievers using calculators did not improve more in their weak areas than those who did not use calculators; and the use of calculators did not affect the 8th grade high achievers significantly on algebra achievement. With regard to the effectiveness of calculator-assisted instruction in 9th grade general math classes, Toole (1979) found no significant difference between the experimental and control groups. With respect to the effect of the usage of a programmable calculator upon the achievement of 8th and 9th graders in algebra course, the results from Quinn's study (1975) showed that students with the aid of calculator demonstrated no better achievement than the students did without the aid of calculator. As to the effect of the calculator use on student achievement in graphing linear functions, negative results were reported in Vazquez's study (1990). Similar findings on the achievement of 7th graders in math computational skills were also found by Shively (1980): The low-level reading group that did not use calculators achieved significantly better in math concepts than the low-level reading group that used calculators did; in math concepts, no significant difference was found between the high-level readers in the control group and the high-level readers of the experimental group, which seems to suggest that high-level readers learn effectively in math concepts with or without the aid of a calculator. B. A. Smith (1996) conducted a meta-analysis on the studies of calculator use in math education. While he found significant differences in the overall achievement of students in math in grades 3, 7, 8, 9 and 10 who used calculators in math classes as compared to those who did not use calculators, he observed no significant differences in overall achievement of students in grades 4, 5, 6 and 11.

The above brief review of the literature seems to indicate that calculator use in math learning may or may not lead to better learning outcomes of students. The literature also shows that in all those studies calculators were mainly used by students as an aid in math and science learning. The effects of using the graphing function of a calculator as a demonstration device by a teacher in the instructional process remains to be studied. The purpose of the study was to investigate the effects of using the TI92+ calculator (as a demonstration device by the teacher) to demonstrate geometric diagrams in the instructions on high school students' learning in geometry.

Method

Participants

Students (N =82) from three high school geometry classes participated in the study. The classes were in place before the study was started. The three classes were composed of mostly 10th graders and a small number of 11th graders. In Class 1, there were 26 students (12 females, 14 males; 10th graders = 24, 11th graders = 2). In Class 2, there were 28 students (12 females, 16 males; 10th graders = 27, 11th graders =1). In Class 3, there were 28 students (14 females, 14 males; 10th graders = 25, 11th graders = 3). In terms of performance in math and overall academic performance, the 3 classes were not considered to be different from each other by their teachers: Class 1 had an average math GPA of 2.81, and an overall GPA of 2.92; Class 2 had an average math GPA of 2.93, and an overall GPA of 2.76; fo Class 3, the average math GPA was 2.68, and the overall GPA was 2.88.

The students of the school were living in a mid-west suburban area. They were mostly from the middle socioeconomic families, with a vast majority of the students from Caucasian families. The participating teacher (male) was certified in math instruction, and had 6 years of teaching experience. The teacher had taught geometry concepts and drawings in both school and industrial settings. He was a skillful user of the TI83, TI86, and TI92+ calculator.

Instrument

The TI92+ calculator used in this investigation is the second Texas Instrument calculator computer. It has a Motorola 6800-10MHz processor with 128K of RAM and 240x128 pixels LCD. Developed for geometry exploration and modeling, a premier feature of the calculator is to run Geometer's Sketchpad on the TI92+. The calculator can be used to accomplish Euclidean constructions with the drawing tools in the toolbox, and the commands in the Construct menu; to create constructions that are translated, rotated, and dilated by fixed, computed, and dynamic quantities; to measure properties of a sketch and work in rectangular or polar coordinate systems; to add labels and captions; to change the visual properties of displayed objects; and to create animations.

The TI92+ calculator provides a dynamic displaying of angles. With the calculator, the vertex of a triangle can be removed, and the calculator can recalculate the measure of each interior angle and each exterior angle at each vertex. Changes and calculations can be conducted instantly, which provide for a dynamic illustration of the theorem of angles making up linear pairs at any triangle vertex.

In this study, to display geometric diagrams in the classroom, the teacher connected Sketchpad on the TI92+ calculator to a TI92+ Presenter, which was connected to an overhead projector and set on top of the overhead projector. The geometric diagrams were displayed via the overhead projector onto a screen facing the students. During the instruction, the teacher mainly manipulated the TI92+ calculator to demonstrate the geometry diagrams to the students in the class.

Procedure & Design

The study utilized a pretest, treatment and posttest with control group design. Class 1 and 3 were the experimental group, Class 2 was the control group. In this case, the control group was selected by a random drawing.

The standard teaching practice applied by the teacher went as follows: Teacher draws geometric diagrams by hand in the teaching of geometry. This teaching method was applied with the control group. An example of the standard teaching method is in the teaching of the theorem of angles making up linear pairs at any triangle vertex. In this situation, the following steps are involved: At the beginning of class, the teacher announces the subject of the class as "linear pairs and supplementary angles." Then the teacher explains the subject in detail and turns to the white (black) board to draw a diagram to illustrate the concept: The teacher draws a triangle, talks out loud the measure of each angle to the students. Next, the teacher extends each side segment as a dashed line beyond the vertex. Then the teacher calculates and writes the supplement to the interior angle at the vertex. The supplement to the interior angle would be called part of the linear pair at the vertex. The teacher would repeat the drawings by illustrating similar examples at least twice each time. Afterwards, the students practice on such drawings; in the meantime, the teacher provides them feedback and guidance as necessary.

In a typical TI92+ calculator-generated diagram demonstration session (used with the experimental group), the teacher would carry out the following procedures to teach the same concept (the theorem of angles making up linear pairs at any triangle vertex): At the beginning of class, the teacher explains the subject in detail, and then he turns to the calculator and calls up (opens) the first diagram from the calculator's memory. The diagram to illustrate the concept of linear pairs and supplementary angle is displayed in 3 to 5 seconds. The first diagram shows a triangle. Then the teacher prompts the calculator to display the interior angle calculation at the first vertex. Next, the teacher explains the calculation and points to the supplementary angle. The teacher would repeat this process at each vertex of the triangle. Routinely, the teacher would call up two additional drawings illustrating similar problems from the calculator's memory. Each problem is taught with the same method.

The study was started during the second week of a semester. At the beginning, all students in the 3 classes were given a pre-test. The test items were provided by the student's textbook--Geometry: Integrations, Applications, Connections (Glencoe/McGraw-Hill Publishing Company, 1998). Then the students in the experimental group received the TI92+ assisted instructions and the control received the standard instructions for 12 weeks. The students also received weekly test, which was developed by the textbook developers. At the end of the study, all the students received a posttest, which was the same test as the pretest. The raw scores from the pretest and posttest of the 3 classes were analyzed respectively with the Dependent t Test (for within-class comparisons) and the ANCOVA test (for between-class comparisons).

Results

Results from the Dependent t Test indicated that all 3 classes made significant gains in geometry knowledge after 12 weeks. See Table 1. Results from the ANCOVA test showed that no significant differences were found between the classes. See Table 2.

With respect to the difference that had occurred but not expected in the study, the participating teacher observed that it seemed to take the students in the experimental group a little less time to learn the knowledge in a class session, or they learned a bit faster than the students in the control group.

Discussion

The results of the study show that a teacher can use the TI92+ calculator as a demonstration device to teach students geometry as effectively as she/he would use hand or manual drawing for demonstrations. Students can learn geometry effectively when the diagrams are demonstrated via the TI92+ calculator on a projected screen. As the participating teacher observed, the students in the experimental group did learn a little bit faster or it took them a bit less time to learn what was taught in a class session. It is not known why the students learned faster in this (calculator) condition. However, it needs to be pointed out that the evidence did not show the students who were taught with the calculator demonstrations learn better. As to whether this teaching approach (using the TI92+ to demonstrate diagrams instead of using hands to draw diagrams) can be applied as a regular instructional method, the evidence from this study provides a positive answer. Nevertheless, the method should not be considered to be a better teaching approach (than the manual drawing method) for geometry instructions, since no evidence from this study supports such claim. Further research on the use of calculator as a demonstration device in classroom instructions is needed since more empirical evidence will provide a better understanding of the effects of using calculator as a demonstration device in classroom instructions.

On the other side, it seems obvious that for a teacher to learn to use the TI92+ calculator as a demonstration device in geometry instructions training and practice are needed. First, a teacher needs to learn how to skillfully operate the calculator to produce geometric diagrams quickly in order to teach students in a smooth way. This type of training seems to be a prerequisite for the teacher before she/he can actually apply this teaching method in a classroom. It seems logical to say that just like using any technology in instructions, one needs to learn how to use the equipment or device first.

Conclusion

The idea on whether the TI92+ calculator can be used to demonstrate geometric diagrams for instructional purpose was studied in 3 high school classrooms for 12 weeks. The results from data analyses indicated that students who were taught with the calculator-generated geometric diagrams learned as effectively as those who were taught with the standard hand drawing method. Based on the evidence, it is tentatively concluded that the TI92+ calculator can be used effectively as a demonstration device to generate geometric diagrams for instructional purpose in high schools.

References

Adams, T. L. (1993). The effects of graphing calculators and a model for conceptual change on community college algebra students' concept of function (Doctoral dissertation, University of Florida, 1993). *Dissertation Abstracts International, 55* (07), Section A, 1859.

Addis, G. H. (1978). The use of programmable calculators in the teaching of economics. Part I. *Economics, 14*(61), 3-8.

Austin, J. D. (1992). Graphing statistical functions. *School Science and Mathematics, 92* (5), 278-280.

Castillo, T. F. (1997). Visualization, attitude, and performance in multivariable calculus: Relationship between use and nonuse of graphing calculator (high school students) (Doctoral dissertation, The University of Texas at Austin, 1997). *Dissertation Abstracts International, 59* (02), Section A, 0438.

Chandler, P. A. (1992). The effect of the graphing calculator on high school students' mathematical achievement (Doctoral dissertation, University of Houston, 1992). *Dissertation Abstracts International, 53* (11), Section A, 3832.

Chang, L. L. (1979). An examination into the effects of calculator-assisted instruction on the mathematics achievement and attitude of seventh and eighth grade disadvantaged students (Doctoral dissertation, Cornell University, 1979). *Dissertation Abstracts International, 40* (03), Section A, 1323-1324.

Clark, G. J., Kuemmerle, E. W., & Lieto, L. R. (1975). Programmable calculators: Uses in freshman chemistry laboratories. *Journal of Chemical Education, 52*(7), 423.

District of Columbia. (1992). *Calculators and computers: NAEP facts.* (ERIC Document

Reproduction Service No. ED 342 682).

Doenges, K. G. (1996). Spatial skills, confidence, gender and graphing calculator use in the high school precalculus classroom (Doctoral dissertation, The Ohio State University, 1996). *Dissertation Abstracts International, 57* (07), Section A, 2923.

Foster, P. A., & Mueller, U. (2000). *Graphics calculator usage in the West Australian Tertiary Entrance Examination of Calculus.* (ERIC Document Reproduction Service No. ED 443 423)

Glencoe/McGraw-Hill Publishing Company. (1998). *Geometry: Integrations, applications, connections.* New York, NY: Author.

Maratta, J. J. (1996). *Using a TI graphing calculator in college algebra.* Dubuque, Iowa: Kendall/Hunt Publishing Company.

Marks, G. H. (Ed.). (1994). *Mathematics/science education and technology, 1994.* Proceedings of the International Symposium on Mathematics/Science Education and Technology, Sen Diego, California, July 21-23. (ERIC Document Reproduction Service No. ED 375 801)

Myers, K. A. (1998). The use of graphing/symbolic calculators in high school mathematics: A study of teacher knowledge, beliefs, and practices (calculator usage) (Doctoral dissertation, University of Cincinnati, 1998). *Dissertation Abstracts International, 59* (05), Section A, 1500.

Parker, J., & Widmer, C. C. (1992). Teaching mathematics with technology: Computation and estimation. *Arithmetic Teacher, 40*(1), 48-51.

Quinn, D. R. (1975). The effect of the usage of a programmable calculator upon achievement and attitude of eighth and ninth grade algebra students (Doctoral dissertation, St.

Louis University, 1975). *Dissertation Abstracts International, 36* (07), Section A, 4324-4325.

Saurino, D. R., Bouma, A., & Gunnoe, B. (1999). *Science classroom management techniques using graphing calculator technology: A collaborative team action research approach.* (ERIC Document Reproduction Service No. ED 429 828)

Schlaphoff, C. W. (1975). CAI on a programmable calculator. *MATYC Journal, 9*(1), 42-46.

Shively, J. C. (1980). An investigation of effects of the hand-held calculator on the mathematics achievement of students at the seventh grade level (Doctoral dissertation, University of Southern California, 1980). *Dissertation Abstracts International, 41* (07), Section A, 2921.

Smith, B. A. (1996). A meta-analysis of outcomes from the use of calculators in mathematics education (Doctoral dissertation, Texas A&M University-Commerce, 1996). *Dissertation Abstracts International, 58* (03), Section A, 0787.

Smith, J. P. (1998). *Graphing calculators in the mathematics classroom. ERIC Digest.* (ERIC Document Reproduction Service No. ED 433 183).

Spero, S. W. (1977). *Computers and calculators: A strategy for combined usage in trigonometry.* (ERIC Document Reproduction Service No. ED 156 208)

Stacey, K., & Groves, S. (1994). *Calculators in primary mathematics.* (ERIC Document Reproduction Service No. ED 373 963)

Toole, B. A., Z. (1979). Evaluation of the effectiveness of calculator-assisted curriculum and instruction in ninth grade general mathematics classes (Doctoral dissertation, University of California, Berkeley, 1979). *Dissertation Abstracts International, 40* (07), Section A, 3852-3853.

Vazquez, J. L. (1990). The effect of the calculator on student achievement in graphing linear functions (Doctoral dissertation, University of Florida, 1990). *Dissertation Abstracts International, 51* (11), Section A, 3660.

Vonder Embse, C. (1997). Using a graphing utility as a catalyst for connections. *Mathematics Teacher, 90*(1), 50-56.

Waits, B. K., & Demana, F. (1989). A computer-graphing-based approach to solving inequalities. *Mathematics Teacher, 82*(5), 327-331.

Ward, D. E. (1978). The effect of the electronic calculator on problem-solving achievement and attitudes toward mathematics of general mathematics students (Doctoral dissertation, University of Southern California, 1978). *Dissertation Abstracts International, 39* (07), Section A, 4038.

Zink, R. J. (1979). The effects of using a programmable calculator to improve the computational skills of remedial mathematics students in grades 7-12 (Doctoral dissertation, Columbia University Teachers College, 1979). *Dissertation Abstracts International, 40* (09), Section A, 4942.

Table 1

Results from Dependent t Test : Within-Class Effects

Class	Pretest Mean	Posttest Mean	SE of Mean	df	t	p (2-Tailed)
1	65.34	79.58	1.86	25	-.7.67	.000
2	63.65	77.8	1.44	27	-10.56	.000
3	64.19	79.44	1.87	27	-8.16	.000

Table 2

Results from the ANCOVA Test: Between-Class Effects

Source	SS	df	MS	F	p
Pretest*	5206.69	1	5206.69	98.42	.000
Class**	7.9	2	3.95	.075	.928
Error	4126.64	78	52.91		

* Pretest = Correlations between pretest and posttest.

** Class = Between-class comparisons.

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