

Examining Calculator Use in the Mathematics Classroom

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Abstract: Research evidence has shown that the use of calculators in instruction provides positive impact both on teachers' and students' outlook towards Mathematics teaching and learning respectively. Hence, this study examined the calculator use as assessed by 95 Elementary Education students of Batangas State University JPLPC-Malvar during the Second Semester of Academic Year 2015-2016. Primarily, it dealt with the respondents' perception on the use of calculator in mathematics classroom as to teaching and learning; and propose course of action to enhance the teaching practices in Mathematics using calculator. By employing the descriptive type of research and using a researcher-made instrument, the researcher found out that the use of calculator in teaching and learning was beneficial. With this, the researcher proposed a course of action to enhance the teaching practices in Mathematics using calculator.

Keywords: Calculator Use, Elementary Mathematics Classroom, Pre-service Teachers

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Introduction

The world is constantly changing and the realm of education is no exception. New technology, pedagogy, curriculum and research are continually changing the way people teach and direct the education system. Though change cannot be prohibited, those involved can be better prepared to handle the necessary modifications. The significance of education is equal to man's need in technology that cannot be easily ignored at any cost. With the help of technology, different inventions of scientist in acquiring a good quality education helps on every person's way of life. It makes complicated things easier hence, nothing is impossible when man has access in technology.

In the current age people live in, technology has also become an important component and plays an increasing role in education. It is used to support both teaching and learning by infusing classrooms with digital learning tools, expanding course offerings, experiences, and learning materials, supporting learning 24 hours a day and seven days a week, building 21st century skills, increasing students' engagement and motivation and accelerating learning. An advantage of using technology in the classroom is its flexibility and adaptability to differentiated learning. By integrating technology into their classroom, teachers can allow their students to reap the benefits that these technology tools offer and prepare to use technology in the real world (Apolonio, 2006). Herman *et al.*, (2008) noted that one of the

factors affecting the implementation of educational change is the teachers' perception on the efficacy of that change. Indeed, in every new initiative introduced, one of the factors determining success is the teachers' mind set and attitudes toward it. An awareness of teachers' attitudes toward the use of calculators provide some insights into their perceptions of and concerns about calculator use in schools. This helps the change manager to adopt appropriate strategies and approaches to improve teachers' receptivity to change and to implement the change successfully.

It is a trademark that in teaching, specifically in Mathematics, the approach is anchored with too much problem to analyze, numbers to compute and measurements to find. The problem encountered by the students is that they are short-tempered in dealing complex mathematical problem. Young learners need to be instructed and educated in a systematic manner by teachers, who are more knowledgeable ones. Since the conception of students' culture in mathematics is a burden, a teacher having enough knowledge and skills in using calculator is a great help to them.

Calculator proponents claim that calculators allow students to spend less time on tedious calculations and more time on understanding and solving problems. It helps students develop better number sense and allow students to study mathematical concepts. It simplifies tasks while helping students determine the best methods for solving problems and it also makes students more confident about their math abilities. The problem reveals that, in spite of these advantages, still one of the most controversial pieces of educational technology to enter the classroom has been the calculator. It is a sort of fear that students' computational abilities would be ruined, that students would become too reliant upon technology, that they would not realize how to compute manually and that they would not learn from their errors. There are arguments from proponents of calculators that sound much like the argument of educational technology today. Students must learn to use these modern devices in order to find their way in the information age.

Brunette (2011) stated that Mathematics curriculum in the elementary grade levels does not require the use of calculators for students to become proficient and gain the necessary fundamental understanding that they need to continue into higher levels of mathematics. Students should be proficient at adding, subtracting, multiplying and dividing without the use of calculator. Calculators should only be used after students have gained a firm grasp of the basics of Mathematics to alleviate the tedious and repetitive work. In upper elementary grades, students can use the calculator to explore the relationships among various representations of rational numbers (Reys and Arbaugh, 2001). Appropriate instruction that includes calculators can extend students' understanding of mathematics and will allow all students access to rich problem-solving exercises (NCTM, 2000). In order to have a positive impact on students' learning of mathematics, teachers must be knowledgeable as how to put the calculator into practice. This technology should be used as a supplement to learning and not as a replacement for learning computational algorithms.

This research is prompted by this idea. The purpose of this study was to examine elementary education students' perception on the use of calculator in the mathematics classroom. The researcher believes that it would be best to conduct the research among Bachelor of Elementary Education (BEED) students because they are directly involved in the computation that requires complex Mathematics in the content courses included in their curriculum. They are also the group of pre-service teachers who will soon be engaged to the primary learners and would become the first molders of young pupils. As a Mathematics

instructor, the researcher is concerned and interested on how they would teach their future pupils topics in Mathematics using calculator. The researcher also believes that conducting this study is timely and relevant, as the effect of using calculators remain an area of great interest to researchers and policy-makers around the world.

Objectives of the Study

The main purpose of this study was to determine the perception towards calculator use of pre-service teachers of Batangas State University, JPLPC-Malvar during the First Semester of Academic Year 2015-2016. Specifically, this study sought answers to the following questions: How do the respondents perceive the use of calculators in elementary mathematics class as to teaching and learning? and What course of action maybe proposed to enhance the instructional practices in Mathematics using calculator?

Methodology

The main purpose of this study was to assess the 95 Elementary Education students' perception towards the use of calculator and propose a course of action to enhance the instructional practices in Mathematics using calculator. For this reason, this study made use of the descriptive method of research, a fact-finding method, through the use of researcher-made questionnaire. Using the questionnaire, the researcher determined the students' perception on the use of calculator with the following interpretation:

Numerical Figures	Range	Verbal Interpretation
4	3.51 – 4.00	Strongly Agree/Highly Beneficial
3	2.51 – 3.50	Agree/Beneficial
2	1.51 – 2.50	Slightly Agree/Slightly Beneficial
1	1.00 – 1.50	Disagree/Not Beneficial

Results and Discussion

This presents the data gathered together with the corresponding analysis and interpretation. The data are presented in tabular form organized in a sequential manner, following the order of the specific problems posed at the beginning of the study.

Perception on the Use of Calculator in Terms of Teaching Mathematics

The succeeding tables present the respondents' perception on the use of calculator in terms of teaching mathematics and learning mathematics. It reveals the computed mean for each statement with its corresponding interpretation.

Table 1. Perception on the Use of Calculator in Terms of Teaching Mathematics

Statements	Mean	Interpretation
The use of calculator in teaching ...		
1. increases students' motivation.	3.13	Agree
2. arouses the interest of students' in mathematics class.	3.22	Agree
3. gives pleasure and enjoyment in solving problems in mathematics.	3.37	Agree
4. helps students understand the mathematical concepts.	3.25	Agree
5. trains students to work independently.	3.19	Agree
Composite Mean	3.23	Beneficial

It can be observed in Table 1 that the respondents find it enjoyable to solve problems in mathematics using calculator. It means that calculator tends to help students understand the mathematical concepts. It was supported by NCTM (2015), stating that calculator use helped students focus on more important aspects of the solving-problem process. They spent more time on reading the problem and making sure they understood what was asked, set up the problem, correctly read the display, and determined whether or not the answer was reasonable. Students investigated their own approaches to problem solving, making their own conjectures, and testing them out on the calculator to quickly see if they were correct. They developed their own examples, gave them a sense of ownership and make them feel that it was truly their work and not just that of the teacher. The overall composite mean of the respondents' perception on the use of calculator as to teaching is 3.23, interpreted as Beneficial. This means students perceived that using calculator was helpful in terms of teaching. It is supported by the study of Casao *et al.*, (2012), revealing that there were really advantages of technology based instructional materials to both pupils and teachers.

Table 2. Perception on the Use of Calculator in Terms of Learning Mathematics

Item Statements	Mean	Verbal Interpretation
The use of calculator in learning ... 1. develops confidence in solving mathematics problem.	3.35	Agree
2. allows students to check answers and helps those with learning difficulties gain confidence at the initial stage	3.52	Strongly Agree
3. improves study habits in mathematics.	3.28	Agree
4. releases stress from solving mathematical problem.	3.29	Agree
5. develops memory techniques in solving mathematical problems.	3.11	Agree
Composite Mean	3.31	Beneficial

It can be gleaned from Table 2 that all statements obtained a mean ranging from 3.11 – 3.52. The highest mean was 3.52 as the respondents strongly agreed that the use of calculator in learning allow students to check answers and help those with learning difficulties to gain confidence at the initial stage. It is supported by the study of Amanyi *et al.*, (2016) mentioning that using calculator in Mathematics class was indeed beneficial not only to teachers but most of all to learners. It was stated that calculators are fast and accurate, which made them a great complementary feature for students. In addition, the student who used calculator exhibited greater self-confidence and achievement, and calculator generated more enthusiasm about Mathematics (NCTM, 2015). The table also reveals the overall composite mean of 3.31. This means that using calculator in learning Mathematics is beneficial. This is supported by the study of Salani (2013) who mentioned that most of the teachers believed that a calculator was a technological tool which was useful to the students.

Course of Action to Enhance the Instructional Practices in Mathematics

After revealing the respondents' perception on the use of calculator as to teaching and learning in Mathematics class, the researcher proposed a course of action to enhance the

instructional practices in mathematics using calculator. The suggested course of action is presented in tabular form along with each specific purpose and brief description.

Table 3. Course of Action to Enhance the Instructional Practices in Mathematics Using Calculator

Objectives	Strategies	Persons Involved	Target Date	Expected Output
1. To enhance the quality of students' learning through reflection and ample support from teachers	Conduct seminars or training about the use of calculator in teaching and learning.	Associate Dean CTE Faculty Students	Last week of First Semester, AY 2017–2018	Pre-service Teachers demonstrate enhanced knowledge in using calculator.
2. To help students in developing mathematical ideas by understanding connections, relationships, and patterns	Organize calculator-related activities spearheaded by SIPNAYAN organization for the benefit of pre-service teachers.	Associate Dean CTE Faculty Students	December 2017 “Education Week Celebration”	Students obtain clear understanding of how and when to use calculator in Mathematics class.
3. To expose students to innovation in technology such as calculator	Attend workshops that help students learn the use of calculator in teaching and learning Mathematics.	Associate Dean CTE Faculty Students	August 2017– May 2018	Pre-service Teachers expose to innovation in technology in teaching and learning Mathematics.

Conclusion and Recommendation

This study revealed that the students' perception on the use of calculator was beneficial and conducting seminars or training about the use of calculator in teaching and learning, organizing calculator-related activities and attending workshops are the proposed course of action to enhance the instructional practices in Mathematics using calculator.

Based on the conclusion drawn from the study, the researcher suggested the following recommendations: The department head may review the Mathematics pedagogical content to include a topic on the effective use of the calculator. This intends to empower future teachers with technological and pedagogical skills for classroom use. This move may also educate these future teachers on the use of this technology so that it may be utilized in the most appropriate and effective manner.

School academic heads may organize school-based training geared towards empowering teachers with calculator skills for effective use during Mathematics instruction. It will help increase teachers' confidence level on the use of calculator.

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