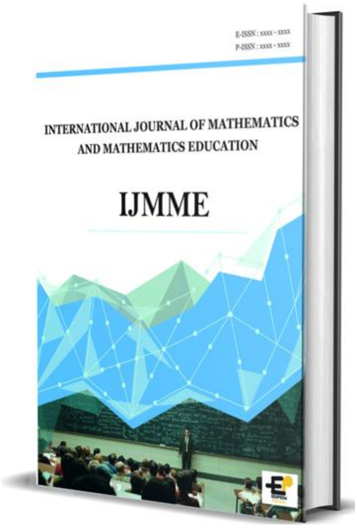

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Abstract

Scientific calculators serve as valuable tools for teaching and learning mathematics. Calculators help learners to understand mathematical concepts and computation. This study investigated students' knowledge of the use of calculators in learning mathematics. The sample comprised 98 senior high school students, selected using a simple random technique. The quantitative study collected data from a developed questionnaire and a mathematics achievement test (MAT). Mean and standard deviation, frequency and Pearson product-moment correlation were used to analyse the data. The findings showed that the students had high hopes about their ability to use calculators to solve problems in mathematics. The study also found that the student's proficiency in using the calculator to solve the tasks involved was moderate. In addition, findings show that even though there was a positive correlation between the students' perceived competence and proficiency in calculator use, the correlation coefficient was weak. Thus, the degree of their perceived capability did not match their actual calculator use. Teachers should continue to provide the needed support to enhance students' understanding of the essential functions of the calculator and enhance their efficient use.

Introduction

The rapid growth of technology in the 21st century has changed almost all spheres of life. As a result, researchers are concerned about how technology can be integrated into the teaching and learning of all school disciplines in the educational curriculum, especially mathematics (Cabanilla-Pedro, 2006; Mistretta, 2005). This growing concern results from the fact that integrating technology into teaching and learning mathematics, allows for lessons that embrace student-centredness and promote students' reflective thinking, problem-solving abilities and reasoning skills (Tay & Mensah-Wonkyi, 2018). Larbi (2019) adds that the world, which has become technologically inclined, requires a critical emphasis on integrating technology in all discourses of school disciplines, especially mathematics. Also, Mudaly (2021) affirms that technology seems to dominate in all spheres of human life, hence the need to take a critical look at its integration into teaching and learning mathematics. This will enable students of the

21st century to accept its uses in learning and job dispensation after school. Abdul Rahman et al. (2022) assert that students growing up in this technological environment should be equipped with the knowledge to explore using calculators for learning and solving problems in their environment.

Knowledge of mathematics is crucial to learning all scientific and technological courses and is vital to the socio-economic development of a nation (Larbi & Okyere, 2016). Therefore, mathematics teaching and learning have attracted significant attention from many educational stakeholders. Mathematical knowledge is believed to be the most essential skill that needs to be acquired by every individual for self-management (Mbugua et al., 2011). Usman (2002) asserts that wherever we go, and in whatever we do or propose to do, the structure of mathematics or its application plays a vital role, probably forming the basis of the emphasis laid in its study at almost all levels of education across the globe.

The increasing demand for technology around the globe requires its integration into the teaching and learning of mathematics, which is the bedrock of all technological advancements (Copriady, 2015; Larbi, 2019). According to Mohamed et al. (2012), teaching and learning mathematics has become necessary in this technological world since all technological advancements, such as the inventions of computers, missiles, cars, trains and many more, are governed by mathematical concepts and laws. Thus, there is no doubt that mathematics is one of the strong pillars of any scientific progress.

Today's technological device that seems to be highly accessible to students is the scientific calculator. A scientific calculator is a hand-held device that has been used by teachers and students in the teaching and learning of mathematics for many years (Kissane & Kemp, 2012). The use of calculators in learning mathematics develops learners' interest and confidence in learning the subject (Mbugua et al., 2011; Pomerantz, 1997). Abedalaziz (2011) asserts that the use of calculators in learning mathematics reduces the heavily computation that students often associate with the subject. The calculator use enables students to explore and experiment whilst learning mathematical concepts and reduces the need for pencil-and-paper computations (Cabanilla-Pedro, 2006). The use of a calculator as a tool for teaching mathematics is necessary due to its ability to develop richness in the value of teaching and learning the subject (Mbugua et al., 2011). Apart from its useful role in the classroom, it is a tool used for computation in daily life and business of all kinds.

Despite their usefulness, many people are still skeptical about integrating calculators into teaching and learning mathematics, with the view that it weakens the students' ability to master basic computational skills in the subject (Cabanilla-Pedro, 2006; Mbugua et al., 2011). The authors further note that students who become over-dependent on the use of calculators are likely to be weak in their basic skills in mathematical computation, which hinders further learning in mathematics and can also prevent them from engaging in thinking or reasoning in learning. A recent study shows that students' regular use of calculators in mathematics tests leads to a decrease in mental abilities, and hence lower scores. For example, Beros et al. (2024) investigated calculator usage and its relationship with student's perception of their fundamental mathematical skills. The study found a negative correlation between the two variables. This suggests that students' calculator use needs to be regulated by varied mathematics test items such that apart from those that may require calculator use, others must require students to demonstrate some basic mathematical or computational abilities. Students need to have sound basic mathematical abilities to serve as a foundation for further learning. Calculators only serve as tools that aid in mathematical computation.

The use of a calculator reduces the lengthy pen-and-pencil paper computational process and also offers immediate feedback that motivates and builds students' confidence in learning mathematics (Abdul Rahman et al., 2022; Abedalaziz, 2011). Young (2017) claims that students engage in higher-order thinking as they determine basic functions that help them to solve a particular task. According to Pomerantz (1997), extensive research on calculator use in the classroom shows it as a valuable tool that improves students understanding in learning. Hence, students need to learn the effective and efficient use of the calculator to be proficient in solving problems in our education sector and in our daily activities.

Statement of Problem

Unit 1.7: Introduction to Calculators in the Ghanaian Basic School Mathematics Curriculum (Junior High School [JHS] 1-3) makes provision for teaching the use of calculators in learning mathematics, even though they are not used in writing the Basic Education Certificate Examination (BECE) at that level. Even though no provision has been made as a learning unit at the senior high level, curriculum developers have captured, as one of the general objectives of teaching mathematics, that “the students will be able to use the calculator to enhance understanding of numerical computation and solve real-life problems” (MoE, 2010, p. iii). This competence is to be attained not under a unit of learning, but instead, teachers are encouraged to use the calculator in various topics where and when the need arises. Some of these topics are natural number systems –“encourage students to verify results using the calculator or computer” (MoE, 2010, p. 4). This same statement is repeated in other topics such as statistics, percentages, trigonometry, indices, logarithms and other related topics that could use the calculator as a computational tool. This means that the students should be able to develop the necessary competencies in using the calculator to solve many problems or tasks in mathematics without necessarily using pencil and paper. This study therefore seeks to investigate senior high school students’ perceived competence in using the calculator in learning mathematics and their proficiency in its use.

Research Questions

These research questions were formulated to guide the study.

1. What are the senior high school students’ perceived competence in using calculators for learning mathematics?
2. What are the students’ proficient use of the calculator in solving mathematics questions?
3. Is there any correlation between students’ perceived competence and their proficiency in calculator use?

Theoretical Framework

Technology Acceptance Model

This study is built on the Technology Acceptance Model [TAM]. Since calculators are technological tools, students' behaviour and actual competence in use are crucial to learning mathematics. TAM is mainly centered on the affective aspect of humans and describes the kind of usefulness a person holds when it comes to technology (Tarhini, 2013). The TAM explains that learners may have some perceived thoughts on the use of technology. This perception can be based on the difficulty in using technology or the learners' intention to use it. Some students may have some notions about the use of the calculator for solving certain mathematical tasks, but their ability to use it to solve the problem becomes a challenge. The learner can also have some perceptions about the use of a calculator and the ease of using it. These might not be at the same level because the perception of use does not necessarily predict the ease of using a calculator to solve mathematical tasks (Tarhini, 2013). The TAM also has other extraneous elements that determine students' acceptance level of technology. Learners might have difficulty with the subject, and this may be a factor that hinders them from readily accepting technological tools. There can also be other factors, like the pleasure that a person feels in using calculators for solving mathematical tasks (Koufaris, 2002). The way the calculator works, and its dynamics are also factors that can influence learners' acceptance and develop their competence in using this technological tool. All these factors, including the comfortability and functionality of using technology in mathematics, can determine the learners' acceptance of using calculators in solving mathematical tasks.

The Use of Calculator in Learning Mathematics

At the primary level, mathematics usually deals with arithmetic and seeks to develop learners' basic computational skills. As many mathematical concepts are introduced, students can make good use of calculators to make computations much easier. Concepts like logarithms, trigonometric functions and matrices can be effectively computed when learners use calculators in learning (Abedalaziz, 2011). Research shows that calculator use plays a vital role in students' learning, as some students can demonstrate mastery of concepts when they use calculators (Abedalaziz, 2011; Mbugua, 2011). Educators believe that when students consistently use calculators, they may become lazy, which imposes the fear of inefficiency in their learning of mathematics (Abedalaziz, 2011; Hembree & Dessart, 1992). However, Sacristán et al. (2009) claim that with the appropriate use of technology, students can learn more mathematics on a deeper level. Technology gives students the prospect of owning the mathematics that is being taught by providing more time for modelling and conceptualising mathematical ideas (NCTM, 2000). Through the use of technology, students can generate multiple representations of solutions to tasks (Ndlovu & Ndlovu, 2020).

Nevertheless, mathematics is not only about computing answers but also focuses on problem-solving. The use of calculators helps to develop the problem-solving skills of learners since they do not have to bother so much with computations but rather with understanding concepts and making mathematical inferences out of the problems. As much as there is a growing need for technology, teaching is becoming more advanced every day so the use of a calculator is not only a learning aid but also a necessary teaching tool in our contemporary teaching of mathematics (Abedalaziz, 2011). Using calculators has helped to modify teaching methods in recent times. (Miles, 2008). Including calculator technology in teaching and learning mathematics can also reduce learners' fear of mathematics, provide a smooth learning environment, and bridge the gap between gender differences in learning mathematics (Abedalaziz, 2011). According to the author, calculator use provides a smooth sense of interaction and that females can work autonomously and provide good results as compared to males, which increases their confidence in learning.

Students' Perceived Competence in the Use of Calculators

Competence is integral to all aspects of work and learning, and this is why sociocultural motivational theories regard competence with much importance (Elliot et al., 2002). Sometimes learners have the notion that they are knowledgeable or competent in a subject area and this is where the concept of perceived competence comes into play. Levels of perceived competence are usually seen when students have a self–concept of their efficacy and display self–reported confidence in their mathematical competence (Elliot et al., 2002). This is normally influenced by the roles played by teachers and students, which allows autonomy in dealing with mathematical problems (Harter, 2015). Studies show that there are factors that affect students' perceived competence in the use of calculators. Some of these are the support that teachers give to students and the immediate feedback the calculator provides to students (Vallerand & Reid, 1984). The supportive roles displayed in the learning environments can influence learners' competence in the use of calculators, and this is sometimes judged by how students approach challenging questions. Therefore, it appears that learners' sense of control and self-efficacy are based on their perceived competence through social support within a positive sociocultural environment (Skinner & Edge, 2002).

The level of competence one has in using a calculator to solve mathematical tasks makes one more motivated and has little or no fear of dealing with problems independently (Reeve, 2002). The author claims that learners who are competent in technology approach problems confidently and work independently. The opposite occurs when it comes to those who are not highly competent. That is, the more positive an individual's perceived competence, the more that person will desire to work with confidence and autonomously. In contrast, those with negative perceptions of competence about their calculator use will exhibit high levels of avoidance of its use in solving mathematical tasks (Deci & Ryan, 2012; Reeve, 2002).

Impact of Calculator Use in Learning Mathematics

Using calculators is becoming increasingly necessary at almost all levels of teaching mathematics. In some countries, like Ghana, students may only use calculators from the secondary school level. The impact of the use of calculators is becoming more debatable every day. Some myths have been seen as having negative impacts, and this has created several other misconceptions (Mbugua, et. al., 2011). Other studies have indicated that calculators make students lazy, and they tend not to appreciate using pencil–paper methods in solving mathematical problems. Others are more concerned with the display of results, especially regarding graphical calculators (Dunham, 2000). A graphical calculator displays graphs of functions, but screen size limits its ability to display the full nature of functions. This may limit students' understanding of how the graph is represented (Dunham, 2000). Therefore, Van Der Kooij (2001) emphasises that the concern should be providing the needed support for learners to visualise calculator results properly. Therefore, calculators' positive impact should be of greater concern to educators than its flaws. According to Van Der Kooij (2001), the use of calculators helps students to see different dimensions of mathematics, which makes way for flexibility.

The ability to develop skills in searching for the appropriate function, operation, or formula is a positive impact brought about by using calculators. For instance, when a student wants to solve a quadratic equation using the calculator, the display function of the form: $ax^2 + bx + c = 0$ is a learning process that enhances students' understanding of quadratic functions or equations. Students can visualize concepts because symbols like mean, standard deviation and others make them easily give mathematical representations of problems (Van Der Kooij, 2001). Also, Goos and Bennison (2008) in a study, asserted that the majority of teachers agreed that technology makes calculations quicker, helps students understand concepts, enables real-life applications and allows students to see the link between different representations. The use of calculators in the teaching and learning of mathematics has several impacts, and the support given by educators can help reform its use in schools.

Method

Research Design

This study used a descriptive survey design, following the quantitative approach, to investigate the students' perceived competence with calculators in solving mathematical problems and proficiency in their use. The design was appropriate since the study only sought to describe the students' beliefs about their competence and what they could do without intervention. Gay and Airasian (1996) assert that a descriptive survey is a study set out to describe the characteristics of the population being studied.

Study Populations and Sample

The population included all Form Two senior high school students in a school randomly selected from the Sunyani West district in the Bono region. The Form Two students were found appropriate because they may have been exposed to many mathematical concepts and tasks on which the study focused on testing their ability to solve using the calculator. A simple random sampling technique was used to select 98 students to participate in the study. This sampling technique gave all the students an equal opportunity to be selected (Sarantakos, 2011). The students were selected from the Home Economics and Visual Arts classes and were numbered 130. The students were proportionately selected from their classes for participation. This comprised 56 students selected from the Home Economics class and 42 from the Visual Arts class. The sample size for the study was determined using the Yamane's (1973) formula given by:

$$n = \frac{N}{1 + N(e)^2}$$

Where n = is the sample size required.

N = the population size

e = permitted error or allowed

Data Collection Instrument

A questionnaire and achievement test were used to collect data from the students. The questionnaire was constructed to elicit responses based on students' knowledge about how capable they are of using the calculator to solve tasks in mathematics. The questionnaire contained closed-ended items to which the students were expected to indicate their competence by indicating their agreement or otherwise with the item on a continuum: strongly agree, agree, undecided, disagree, and strongly disagree. Several items were constructed to cover content areas whose tasks could easily be solved using the calculator. The questionnaire was piloted and tested to estimate its internal consistency, which yielded 0.72. Some of the contents of the mathematics curriculum are real numbers, indices, statistics, surds, vectors, simultaneous equations, and many more.

Table 1: Description of a questionnaire item and corresponding test item

Questionnaire item	MAT item
I can use the calculator to solve questions on linear equations in two variables.	Solve these equations simultaneously: $3x + 5y = -6,\ 2x - 3y = 15.$
I can use the calculator to solve questions on surds.	Find y in the expression. $\sqrt{24} + \sqrt{96} - \sqrt{600} = y\sqrt{6}$ Simplify $(\sqrt{3} - 1)(1 + \sqrt{3})$
I can use the calculator to solve questions on fractions.	Evaluate $(2\tfrac{1}{2})^2 - (1\tfrac{1}{2})^2$
I can use the calculator to find the gradient of a line joining the points.	Find the line gradient joining the points P(-2, 3) and Q(4, -7).

When the participants responded to the questionnaire items, a Mathematics Achievement Test (MAT), constructed to match the contents on which the questionnaire item was based, was administered to obtain information about their competent use of a calculator in solving mathematical tasks. The MAT consisted of a 40-item multiple-choice test. Each of the items in the MAT was followed by a list of four options from which the participants were expected to select the correct answer. According to Okyere et al. (2018), multiple-choice tests are a type of test in which learners are given a list of options to choose the appropriate answer to the given task. A sample of the MAT items that match the questionnaire is shown in Table 1.

Data Collection

Those who agreed to participate in the study were asked to bring their scientific calculator, even though provision was made for two participants who wished to take part but had their calculator spoiled. The questionnaire was first administered to the 98 selected participants on the day of the data collection. After they had responded to the questionnaire items, the MAT was administered to them. In both sections, sufficient time was allowed for them to respond to the questionnaire items and answer the questions in the MAT. The data obtained were prepared for analysis. The students' responses about their perceived competence in calculator use were analysed using mean and standard deviation, the frequency of their proficiency (performance) on the MAT, and Pearson product-moment correlation coefficient to determine the correlation between perceived competence and proficiency in using the calculator. The following sections present the details of the analysis of the data obtained.

Ethical Consideration

The school authorities granted permission to conduct this study after the rationale for the study was explained to them. The study's rationale was also explained to the students, who were assured that their participation was voluntary. They were assured of the confidentiality of any data provided and anonymity regarding the report writing.

Results

High school students' perceived competence in the use of a calculator

The study sought to identify students' perceived competencies in using calculators for learning or solving mathematics problems. Responses were obtained about the student's ability to use the calculator to solve questions on selected topics involved in MAT. The topics include real numbers, surds, logarithms, indices, the mean of given data, vectors, simultaneous equations, evaluating given expressions, trigonometric ratios, quadratic equations, the magnitude of points, the gradient of a line and the variance of a given data. The results are presented in Table 2.

Table 2 shows the students' responses to rating their abilities using the calculator in learning mathematics. The items sought to determine the students' self-rated competence in using calculators for certain computations on various topics of interest to the researchers. A 5-point Likert scale was used for the student's responses, and the decision was made based on the mean rating. The decision was made by assigning the mean ratings less/equal to 2.3 to be low, between 2.3 and 3.7 - moderate, and those greater/equal to 3.7 to be highly competent.

Table 2: Results of Students Competency in Calculator Use

ITEM	MEAN	SD
I can use the calculator to solve questions on real numbers.	4.55	0.67
I can use the calculator to solve questions on surds.	3.95	0.75
I can use the calculator to solve questions on logarithms.	3.92	1.10
I can use the calculator to solve questions on indices.	4.56	0.94
I can use the calculator to find the mean of a given data.	3.48	1.26
I can use the calculator to solve questions on vectors/to find the vector of two points.	3.64	1.30
I can use the calculator to solve questions on simultaneous equations.	4.46	1.11
I can use the calculator to evaluate a given data.	3.52	1.21
I can use the calculator to answer some questions about trigonometric ratios.	3.05	1.13
I can use the calculator to solve questions on quadratic equations.	3.99	1.20
I can use the calculator to find the distance between two given points.	3.56	0.96
I can use the calculator to find the gradient of a line joining two points.	2.95	1.13
I can use the calculator to find the variance of a given data (non-grouped).	2.73	0.79
	3.72	1.11

Interpretation: less/equal to 2.3 – low, between 2.3 and 3.7 – moderate, greater/equal to 3.7 – high

From Table 2, most students' responses show that they can use the scientific calculator to do mathematical computations on the topics or tasks the MAT centred on. This is based on the result of several mean responses recording values of 3.00 and above. Of the 13 items measuring the students' competence in using calculators, 6 (almost half) had a mean response above 3.7, with the rest having a moderate response rating (see the interpretation under Table 2). This could mean that in solving these mathematical tasks, the students would likely not spend too much time performing the seemingly tedious computations that the calculator can do, as had been put forth by some researchers (Abdul Rahman et al., 2022; Mason, 2010). Thus, the students can obtain results very quickly and accurately. Abdul Rahman et al. (2022) assert that calculators, an alternative calculation tool, can yield accurate results easily and quickly.

Some tasks or topics that received a high mean rating for calculator use in the computation were real numbers, surds, indices, logarithms, simultaneous equations, and quadratic equations (see Table 2). What is worth noting is that if the students perceived competence in calculator use is accurate, then there is a likelihood that their confidence in learning mathematics can be developed. According to Abdul Rahman et al. (2022), when students consider and use the calculator as a learning tool, they often have confidence in the answers they obtain for the problem solved.

The student's high rating of their use of calculators shows they may have a high acceptance of using calculator technology in mathematics discourse. This acceptance could emanate from possible exposure given by their teachers and their continued effort and desire to use it as a tool for learning mathematics. Teachers need to use calculators in their classroom mathematics teaching and provide their students with support and encouragement for continual use of the calculator for learning and solving problems in mathematics (Abdul Rahman et al., 2022). In summary, the results in Table 2 show that most students believed in their abilities to use the calculator in learning mathematics.

Students proficient use of the calculator in solving mathematics questions

The participating students' proficiency in calculator use was measured by the number of questions they solved correctly using the calculator (performance). The test instrument for assessing the students' proficient use of the calculator contained forty (40) objective questions in the areas mentioned. The results are presented in Figure 1.

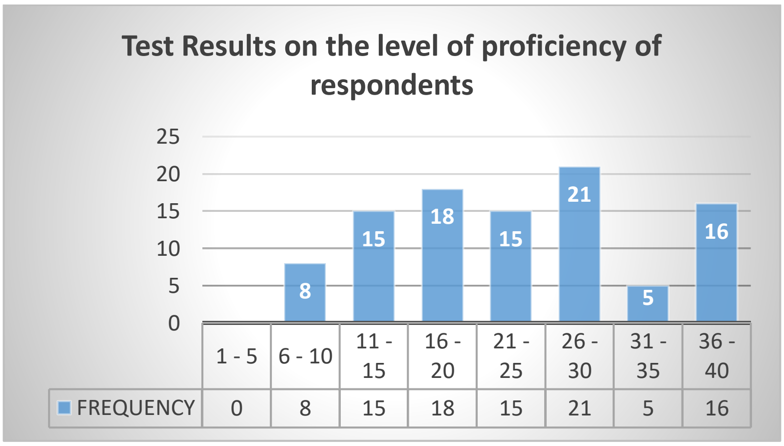

Figure 1: Test Results on the level of proficiency of respondents

Figure 1 shows that 16 students (16.3%) could use the calculator to solve almost all the tasks on the topics or areas assessed. Thus, these students showed a high level of proficiency in using the scientific calculator to solve problems in mathematics. In other words, only 16.3% of the students who participated in the study demonstrated high knowledge of using the scientific calculator's basic functions to solve many test questions. Ideally, none of the students scored all the 40 tasks. According to Abdul Rahman et al. (2022), students' proficiency in calculator use can be achieved when they have adequate knowledge of the essential functions of the scientific calculator to solve problems accurately. Dagan et al. (2020) assert that effective use of calculators in teaching and learning mathematics enhances students' performance on tests, which results from their understanding of the concepts learned and their motivation and interest in learning. The high performance of 16.3% of the participants could mean that they enjoyed mathematics instructions that frequently and effectively used calculators in the discourse.

Fifty-seven students (58.2%) could use the calculator to solve more than half of the test items. This is a good performance since more than half of the participants (58.2%) showed good knowledge of using the calculator to solve the questions. This can improve their confidence in learning and solving mathematical problems. For example, in a study conducted by Abdul Rahman et al. (2022), at a seminar on the use of a scientific calculator that was organised for students, it was found that the students felt more confident in the answers obtained using the calculator than when they solved problems without the use of the calculator. A study by Sacristán et al. (2009) indicates that using the calculator helps students learn more mathematics and deepens their understanding. The authors add that its integration into the educational sector requires changing how SHS teachers and students conduct their core activities.

Even though results show that most students (58.2%) correctly solved more than half of the items, 41 (41.8%) solved less than half of the items in the study. This probably means that 41.8% of the participating students still struggled with demonstrating adequate knowledge in using the essential functions of the calculator to compute the required tasks. What is worth mentioning is that none of the students scored under six. This indicates that at least all the students in the study knew about using the calculator to solve problems in mathematics. In summary, more than half (58.2%) showed good proficiency in using the calculator to solve mathematical questions by using the calculator to solve more than half of the questions. Of the study participants, only 16 (16.3%) of those students showed high proficiency in using the calculator to solve almost all the questions (36 to 40).

Correlation between Students' Perceived Competence and their Proficiency in the Use of a Calculator
The study determined the relationship between the students' perceived competence and the number of questions they could solve (proficiency) using a calculator on the MAT. The results of the correlation between the two constructs are shown in Table 3.

Table 3: Correlation between Students' Perceived Competence and their Proficiency

Pearson Correlation	0.341
Significance (2-tailed)	0.000
N	98

$p < 0.05$ is significant

Table 3 shows a weak positive relationship between the students' perceived competence in using a calculator and their proficiency. The Pearson product correlation coefficient value of 0.341 at a 95% confidence level shows a significant result. Thus, not only did the students rate their ability to use the scientific calculator very high, but it was also seen in their performance (learning outcome) on the tasks used to assess their proficient use of the calculator. Even though the relationship between the two measured constructs was significant, the Pearson correlation coefficient value is weak based on Joshua's (2005) interpretation of the correlation coefficient.

A possible interpretation could be that although many students may have rated their abilities very high using the calculator, this did not match their task performance. Thus, a student may think he or she can perform mathematical computations with the calculator, which may not be the reality. Thus, through the lens of the theoretical framework, many participants showed their acceptance of the use of technology (Tarhini, 2013). However, this acceptance was not seen in the realistic manifestation of the calculator use in the computation of mathematical tasks. This implies that some students could not use the essential functions of the calculator to solve the tasks as they perceived them.

Conclusion

The analysis of the students' responses reveals that the majority of them are highly competent in using calculators in mathematics learning. This is a very significant finding because it shows their level of technology acceptance in their mathematics discourse. The participants felt they could use the calculator to aid their computations in most topics on which their competencies were assessed.

The second finding was that a little more than half of the students showed proficient use of the calculator as measured by the number of questions they could correctly compute. Thus, they were moderately proficient in calculator use. This is important because students' practical and efficient use of the calculator will enable them to solve many questions, perhaps in exams where they often work in a time-bound.

The third significant finding is that even though the students had high hopes about their abilities using the calculator, the estimate of the relationship between their perceived competence and their actual proficiency in its use produced a weak correlation coefficient. However, the correlation was significant. This finding is crucial since it draws attention to possible guidance and support teachers need to offer students to deepen their knowledge and proficient use of the calculator in solving problems in mathematics.

This research shows that students' problem-solving abilities can be improved when they are given the necessary guidance and continued support for calculator use in mathematics discourse.

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