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## **Influence of Secondary School Students' Use of Calculators on their Numerical Skills**

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**Abstract:** The research aimed to investigate the relationship between calculator use in secondary school education and students' numerical abilities. Three research questions and corresponding hypotheses were formulated to guide the study. The survey design employed was descriptive in nature. The study population consisted of 372 senior secondary science subject teachers from the 62 public secondary schools in the Awka education zone of Anambra State. A sample size of 100 senior secondary science subject teachers was selected using a multi-stage sampling procedure for the study. Data were gathered using a questionnaire with seven items and a four-point rating system. Three research assistants aided the researchers in utilizing a direct approach to distribute the instrument to the respondents. The data was then analysed using both descriptive and inferential statistics. The results showed that the science subject instructors in the Awka education zone, regardless of their gender or degree of expertise, concur that calculators can affect students' numerical proficiency in both positive and negative ways. Teachers of science in the Awka education zone, regardless of gender, concur that calculators help students quickly and effectively solve challenging issues. Surprisingly, educators in the Awka education zone with a B.Ed. in science subjects do not believe that the use of calculators enhances students' mathematics skills. It was found that students could answer challenging issues more quickly when they used calculators. It was suggested, among other things, that teachers incorporate calculators into the science curriculum in secondary schools in an acceptable manner, and that they support students in continuing to use calculators as a learning tool for mathematics and science problems.

**Keywords:** education, calculators, numerical, skills, students.

## Introduction

Education is a purposeful pursuit that plays a fundamental role in shaping individuals to make informed decisions in varied situations, ultimately contributing to a more effective and fulfilled society. Its primary objectives include imparting knowledge, fostering skill-building, and molding character (Chazan, 2022). As a result, education improves the mental states and dispositions that educated individuals possess (Biletzki & Matar, n.d.). There are three stages of education in Nigeria: primary, secondary, and postsecondary. Since the research was focused on secondary school students, secondary education was the focus of this study (Eleje et al., 2017; Eleje, 2019). The United Nations Educational, Scientific, and Cultural Organization (UNESCO, 2019) defines secondary education as the level that follows higher education, vocational training, or employment. Secondary education normally occurs following six years of primary school. Secondary school curriculum is divided into two categories: arts and science. Since science classes require students to utilise calculators, science is the topic area that this study focuses on. Among the science subjects are biology, chemistry, physics, mathematics, and additional mathematics (Eleje et al., 2017; Eleje & Esomonu, 2018; Eleje, 2019).

A calculator is a tool used to calculate numbers' arithmetic operations. The only mathematical operations that basic calculators can do are addition, subtraction, multiplication, and division (Best Places, n.d.). More advanced calculators, on the other hand, can perform logarithms, square roots,

trigonometric functions, exponential operations, and hyperbolic functions. Some calculators internally carry out all these operations by repeatedly adding things together. The newest calculators have been used by secondary school pupils for years to answer issues (Eleje et al., 2022a; McCauliff, 2003; Metu et al., 2021). The National Council of Teachers of Mathematics (Posamentier & Smith, 2021) states that basic abilities are better learned when calculators are used in conjunction with traditional paper-and-pencil training. They came to the conclusion that, rather than replacing the teaching of fundamental algorithm skills and mathematical processes, calculator use should be properly integrated to reinforce the concepts being taught and facilitate the application of these math processes to real-world scenarios. However, one can wonder if calculator use among secondary school students has helped or hurt their ability to learn. Due to the prevailing lack of success in mathematics, there was a significant outcry from the public about students' mathematical performance, leading to a call for the use of calculators to improve results on WAEC, NECO, and other important exams (Abanobi et al., 2023). This is especially necessary, considering the negative views or feelings which students have for mathematics or subjects requiring numerical skill (Eleje et al., 2020; Esomonu & Eleje, 2017; 2020). As a result, the use of the calculator is permitted in secondary schools in an effort to strengthen students' computational abilities.

From the foregoing, it is visible that the most important aspect of calculation is the students' ability being able to understand the figures and demonstrate fundamental mathematical skills through critical thinking. With this, they can solve basic mathematical problems of addition, multiplication, division, and subtraction without looking for a calculator to do the work of a robot. The ability to calculate change manually without relying on technology is diminishing, which is concerning because it is a simple task that society is increasingly relying on machines to handle, leading to a loss of understanding of the fundamental concept and process (Mead, 2015). It is against this background that the study sought to investigate the influence of calculators use on the numerical skills of secondary school students in Awka Education Zone.

### **Problem Statement**

The widespread concern over students' low performance in Mathematics exams has prompted a push for the use of calculators to enhance their results in WAEC, NECO, and similar tests. The Joint Admission and Matriculation Board permit students to use calculators during exams. Presently, science students taking the JAMB exam receive calculators provided by the board to assist with calculations. In spite of this, there is still a great deal of failure in these science courses that require computation, particularly in mathematics. The West African Examination Council reports that, in comparison to the 81.7 percent pass rate registered in 2021, the data of individuals who passed their WAEC shows a decline in performance of over five percent. On the other hand, according to the National Examination Council examination results, 52% of applicants are unable to receive credit in mathematics and English. What could be the reason for this failure in secondary school students even if calculators were introduced to address the problem? Might there be other elements influencing the way the students perform? Or that the students lack sufficient knowledge about the use of calculators? Additionally, most of the time, teachers fall short in helping students apply these mathematical procedures to real-world scenarios and in effectively integrating the fundamental

principles they are teaching. Examining the impact of calculator use on secondary school pupils' arithmetic proficiency became necessary at this point. The issue this study attempts to answer is: Does the usage of calculators by students have a beneficial or detrimental impact on their numerical skills?

### ***Purpose of the Study***

The major purpose of the study was to determine the influence of calculators use on the numerical and critical thinking skills of secondary school students as perceived by science subject teachers in secondary school.

Specifically, this study was designed to determine:

1. Teachers' perspectives on the influence of calculators on students' numerical skills based on gender.
2. Teachers' perspectives on the influence of calculators on students' numerical skills based on experience.
3. Teachers' perspectives on the influence of calculators on students' numerical skills based on qualification.

### ***Research Questions***

The following research questions guided the study:

1. What do male and female teachers believe about how secondary school students' gender affects their numerical skills when using calculators?
2. What are teachers' perspectives on the influence of secondary school students' use of calculators on their numerical skills based on experience?
3. What are teachers' perspectives on the influence of secondary school students' use of calculators on their numerical skills based on qualification?

### ***Hypothesis***

To carry out the study, the researchers tested the following formulated research hypotheses for rejection or otherwise at 5% level of significance:

**H<sub>0</sub>1:** There is no significant difference between male and female teachers' perspectives on the influence of secondary school students' use of calculators on their numerical skills.

**H<sub>0</sub>2:** The lecturers' perceived influence of secondary school students' use of calculators on their numerical skills did not significantly vary based on experience.

**H<sub>0</sub>3:** The lecturers' perceived influence of secondary school students' use of calculators on their numerical skills did not significantly vary based on qualification.

## Literature Review

### ***Objectives of Secondary School Education***

After primary education but before postsecondary education, children in early to late adolescence receive their education at secondary schools. It is the type of education that provides students with the opportunity to acquire knowledge, capabilities, and expertise needed to thrive and make positive contributions to society (Eleje et al., 2021). Because secondary schools absorb primary school output and generate candidates for postsecondary education across the country, the significance of secondary school education cannot be overstated (Tremblay et al., 2012; UNESCO, 2019). In Nigeria, secondary education primarily strives to:

I. Give all primary school dropouts the chance to pursue higher education, regardless of their gender, social standing, religion, or ethnic heritage.

II. Providing a varied curriculum to accommodate variations in aptitudes, prospects, and future positions.

III Offering sub-professional grades of trained labour in applied science, technology, and commerce.

IV. Fostering and advancing Nigerian languages, artistic endeavours, and cultural heritage within the global cultural framework.

V. Developing in students a drive for excellence and self-improvement.

VI. Promoting national cohesion while highlighting the similarities that bind us despite our differences.

VII. Bringing up a generation of individuals who can think independently, respect others' opinions and feelings, uphold the dignity of labor, recognise the ideals outlined in our broad national goals, and lead moral lives.

VIII. Providing technical knowledge and vocational skills that is essential for the development of the agricultural, industrial, commercial, and economic sectors.

### ***Use of Calculators in the Classroom***

People frequently do not perceive the same necessity for a methodical calculator strategy as they do for a strategic plan to integrate computers into the curriculum. In order to assess how the calculator aligns with the curriculum goals and student needs, collaboration among all stakeholders is necessary. Ochanda and Indoshi (2011) list the following tactics for efficient utilization of calculator in the classroom:

a) Before they perform the calculation, have students estimate how realistic the calculator responses are.

b) Encourage students to actively consider the steps taken to arrive at their responses by using questions and discussion.

c) Include in the lesson plans open-ended tasks or challenges that have multiple viable answers—or none at all.

d) Include problems that are simpler to complete by hand or that get cumbersome when using a calculator to help pupils learn how to selectively utilise them.

e) As an integrated discipline rather than as discrete activities, teach mathematics.

Understanding when to utilise a calculator versus employing other methods is a valuable skill that is frequently undervalued. Basic tasks can demonstrate to pupils that performing calculations mentally and in writing is frequently more beneficial than using a calculator (McCormick, n.d.). Even young children can start understanding the distinctions and connections between arithmetic operations with the help of a guided calculator. Hitting 5+ on the keypad five times is not the same as memorizing  $5 \times 5 = 25$ , as the latter can spark conversations on the relationships between addition and multiplication, revealing the underlying multiplication patterns.

Calculators can aid secondary school pupils in improving their comprehension of algebra and other complex math (Ayamah et al., 2023). If the groundwork for sophisticated calculator use is laid in the elementary years, students will find it easier to grasp advanced mathematical methods. To utilise a calculator effectively, you must set aside time for exploration. Students can move past issues with proper division and observe the concept of how they can use calculators to determine the relationship between the circumferences and diameters of numerous round objects. However, in order to accomplish effectively this job, the instructor must set aside time for the class to work independently on the material until the notion is understood and internalised.

### ***Influence of the Use of Calculators on Students Numerical Skills***

Students should not use calculators all the time, even though they can perform simple calculations quickly. A learner may become incapable of completing these fundamental operations manually if they are constantly depending on a calculator to help them with addition, subtraction, multiplication, and division issues. This might seriously hinder their performance on tests and potentially cause problems later in life when they need to apply these skills to address more complicated challenges. Leng (2011) asserts that calculators eliminate the need for students to possess fundamental knowledge. Using a calculator to compute  $6 \times 4$  is pointless, even for young pupils who are still learning their facts (other than, maybe, to check their answers).

Furthermore, empirical evidence suggests that consistent reliance on calculators for solving basic equations diminishes a student's retention of the solutions. Excessive calculator usage negatively impacts a student's fluency and memory of mathematical concepts, thereby impeding their progression in the field of mathematics (Beros et al., 2024; Castaldi et al., 2020). In reality, students should not use calculators in the classroom unless they have fulfilled specific requirements. They ought to be proficient in the fundamentals of the function being utilised. A third-grader utilising

a calculator to calculate  $6 \times 2$ , for instance, is not utilising it correctly. As previously mentioned, recording a solution on a sheet is very easy, but a genuine grasp and command of the mathematical subject is demonstrated by knowing the underlying concepts of the equation.

It makes no sense to be able to enter numbers into a computer and write down another number unless you know what the number means, from basic multiplications to the quadratic formula. By emphasising memorisation of formulas over comprehension, many high schools unintentionally foster a generation of calculator-abusing kids (Chamoso & Cáceres, 2018; Deneen, 2016).

### ***The Teachers' View on How Calculators Affect Students***

Many teachers, particularly those who did not have the opportunity to use calculators in their elementary and secondary education, consider that the use of calculators should not be included in the mathematics curriculum at the basic level because they will:

i. Encourage laziness because the students will not be in a position to use them. This is according to Radzuan et al. (2021) to become familiar with fundamental concepts such as the multiplication table, basic addition and subtraction, and the use of manipulative objects.

ii. Restrict students' ability to think because the calculator will do the computational task that requires them to think.

iii. Force students to omit some crucial stages from their mathematical computations that illustrate specific topics.

Some educators also state that:

i. Since most students would not be able to maintain calculators adequately, it will merely place a financial burden on low-income parents.

ii. Students' performance in mathematics on the West African Examination Council (WAEC), formerly known as the West African Senior Secondary School Certificate Examination (WASSSCE), had not significantly improved even though calculator use is permitted for pupils. Since most educators lack experience with calculators, how can they effectively instruct their pupils in their use?

### ***Researchers' Opinion on Students' Use of Calculator***

Throughout history, the creation of new calculators has helped to boost our understanding of mathematics. Some claim that pupils are merely using their resources to solve difficulties when it comes to the use of calculators and other technologies in secondary school classrooms (Orellana-Farias & Barkatsas, 2017). According to some, students' utilisation of technology in math classes improves their comprehension of fundamental ideas (Crawford et al., 2016). Calculators can enhance students' math skills when used in conjunction with other math lessons, and kids are more likely to use them less but more effectively (Education Endowment Foundation, 2018). Calculators are a powerful tool for teaching non-calculator computation skills when used in conjunction with mental and other calculation techniques. Students improve their general arithmetic skills and learn

to self-regulate their calculator use, which leads to less (but better) use of the devices overall. According to the Padi (2020) study, the use of calculator effect on attitude toward mathematics is somewhat mixed. Conversely, some individuals think that secondary school pupils' usage of calculators has a detrimental effect on their arithmetic abilities. Professionals began to wonder at the start of the twenty-first century whether calculators were becoming more of a handicap than an aid. According to Duncan (2016), using calculators in math class can have an impact on a student's degree of numerical proficiency. This is due to the fact that using a calculator eliminates the requirement for pupils to understand some basic calculations and procedures because the calculator will take care of them for them. A learner can use a calculator to enter an equation and get the correct result, saving them the trouble of memorising multiplication tables for quick recall. What occurs then when these pupils are given an equation to answer and they do not see a calculator?

Calculators, in the opinion of Brown et al. (2007), ought to be completely removed from classrooms. According to Brown et al., allowing children to rely on calculators leads to adults who lack basic math skills and struggle in a numerically-driven society. It may hinder a student's ability to solve addition, subtraction, multiplication, and division problems if they are always reliant on a calculator. This might seriously hinder their performance on tests and potentially cause problems later in life when they need to employ these skills to handle more complicated challenges (Chiezugo, 2018). Additionally, kids can now cheat on tests more easily because of the availability of graphic calculators. These calculators not only help you do simple math operations but also store data such as formulas and notes. Students can use this to save unapproved information in order to cheat on the test. Given this circumstance, it is unclear why the original calculating technique—using four-figure tables—was abandoned. The aforementioned suggests that the ability of students to comprehend the figures and exhibit basic mathematical concepts is the most crucial component of computation.

This allows individuals performing the functions of a robot by solving simple addition, multiplication, division, and subtraction arithmetic problems without the need for a calculator. It's concerning that although making change without a calculator or computerised cash register is becoming less and less common, people are choosing to rely too much on technology and don't grasp the fundamentals of the process (Mead, 2015). Therefore, the researchers are investigating how the use of calculators impacts the numerical abilities of secondary school students. The review of related literature underlined is the theoretical framework, and the opinions of various experts on the influence of the use of calculator on the numerical skill of secondary school students in Awka Education Zone. However, so many studies have been investigated concerning the influence of the use of calculators on secondary school students, but the researchers did not find studies that determined the influence of the use of calculators on the numerical skill of secondary school students in Awka Education Zone.

## **Research Methodology**

### **General Background**

A descriptive survey design was adopted for this study. The study was conducted in Awka Education Zone of Anambra State. The population of this study comprised of 372 science subject teachers in the 62 public secondary schools in Awka Education Zone of Anambra State (Source: Post Primary School Service Commission, Awka, 2023). The composition of the teaching staff included individuals of varying genders, experience levels, and qualifications. The gender distribution consists of males and females, while experience levels range from 1-3 years, 4-6 years, and 7-10 years. Qualifications include OND, HND, B.Ed, M.Ed, as well as other degrees such as Ph.D, BA.Ed, and BSc.Ed. The diverse combination of these attributes contributes to the overall composition and expertise of the teaching team.

### **Sample**

In order to create a sample for the study, multiple stages of sampling were used. Using a straightforward random sample technique, three local government areas—Awka South, Anaocha, and Njikoka LGAs—were selected among the five local government areas (LGAs) that comprise the Awka Education Zone in the first step. For the second stage, using a basic random sampling technique, eight public secondary schools were selected from each of the three local government regions. The researcher drew the secondary schools with replacement (i.e., balloting with replacement) after writing the names of the public secondary schools in each of the three local governments on pieces of paper, folding them, and placing them in a container. With this, there are now 24 public secondary schools in total. Phase three, starting from Awka South, Anaocha and Njikoka LGAs, 40, 30 and 30 teachers respectively were purposively selected. Therefore, the sample size for this study was 100 senior secondary science subject teachers. The following was a description of the 100 science subject teachers: There were 39 men and 61 women in the group. Of these, 29 have 1-3 years of experience, 56 have 4-6 years, and 15 have 7-10 years. 43 have a B.Ed., 16 have and M.Ed., 17 have an OND, 19 have an HND, and 5 have other (BSc.Ed, BA.Ed) degrees.

### **Instrument and Procedures**

A structured questionnaire called "Influence of Use of Calculators on the Numerical Skill Questionnaire (IUCNSQ)" as their data collection tool were used in the study. The questionnaire was created based on information gleaned from a survey of relevant literature. Expert in measurement and evaluation were used to validate the instrument. There were two sections on the instrument: A and B. The items pertaining to the respondents' biodata were found in Section A. The items in Section B were arranged in a cluster according to the theme or variable (numerical skill), which addressed the three research questions that served as the study's compass. Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Agree (SD) were the four rating categories on the instrument, and they were assigned weights of 4, 3, 2, and 1, respectively.

The researchers and three research assistants directly delivered the questionnaire to 100 teachers in 24 public secondary schools located in the three LGAs of the Awka Education Zone in Anambra State. This was achieved with the aid of the researchers and three research assistants. After distributing the questionnaire to the respondents, the researchers and research assistants promptly gathered it. This resulted in the retrieval of all copies, within two-weeks.

### Data Analysis

Descriptive statistics like mean and standard deviation were used to assess the data gathered to address the study questions, while inferential statistics like the t-test and Kruskal-Wallis H test were employed to evaluate the hypotheses. The statistical package for social sciences, version 23 (SPSS version 23.0), was used for the analysis. Mean ratings exceeding 2.50 were deemed positive, whereas those falling below that threshold were interpreted as negative. A p-value of less than 0.05 was deemed significant. The item means in relation to the actual ranges of numbers were used to determine the study questions and questionnaire items.

### Results

The analysis and findings of the study are presented according to the research questions.

#### Research question 1

What are the male and female teachers' perspectives on the influence of secondary school students' use of calculators on their numerical skills?

#### Hypothesis 1

There is no significant difference between male and female teachers' perspectives on the influence of secondary school students' use of calculators on their numerical skills.

Data relating to the research question one and hypothesis one was analysed and presented in Tables 1 and 2.

**Table 1**

*Teachers' Mean Ratings on the Influence of the Use of Calculator on Students' Numerical Skills Based on Gender*

S/ N	Item Statements	MALE			FEMALE			Total		
		$\bar{X}$	N	Std. Dev.	$\bar{X}$	N	Std. Dev.	$\bar{X}$	N	Std. Dev.
1	The calculator allows students efficiently solving complicated problems	3.69	39	0.614	3.79	61	0.609	3.75	100	0.609
2	The use of calculator makes calculations less rigorous for students	3.44	39	0.718	3.15	61	0.833	3.26	100	0.799

3	The calculators allow minimal room for errors when using mathematical formulas	3.28	39	0.759	3.25	61	0.907	3.26	100	0.848
4	The availability of graphic calculators has made it easier for students to work with numbers	3.08	39	0.703	2.82	61	0.922	2.92	100	0.849
5	Calculators makes it easy to convert the units of measurements	3.31	39	0.863	3.10	61	0.926	3.18	100	0.903
6	The use of calculators hinders students' chances of learning simple mathematics operations	3.59	39	0.637	3.34	61	0.929	3.44	100	0.833
7	The use of calculators enhanced students' arithmetic skills	2.79	39	0.864	2.64	61	1.017	2.70	100	0.959
<b>Cluster total</b>		23.17		5.158	22.12		6.143	22.51		4.952
<b>Cluster mean</b>		3.31		0.737	3.16		0.876	3.26		0.707

Source: Authors' own development.

**Table 2**

*The t-Test of Independent Samples for Comparing Male and Female Teachers' Mean Ratings on the Perceived Influence of the Use of Calculator on Students' Numerical Skills*

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Numeracy	Equal variances assumed	1.333	0.251	1.988	98	0.050	1.09752	0.55198	0.00214	2.19290
	Equal variances not assumed			2.121	95.725	0.037	1.09752	0.51755	0.07015	2.12489

Source: Author's own development.

Table 1 displays cluster mean ratings for gender and overall (3.31, 3.16, and 3.26) that exceed the criteria of 2.50. This demonstrated how students' use of calculators impacts their numerical proficiency, as indicated by the items on the list. In item one, both male teachers (with the highest mean rating of 3.69) and female teachers (with the highest mean rating of 3.79) concur, particularly with the fact that using a calculator helps students answer complex issues quickly. The associated pooled standard deviation for gender and total data (0.737, 0.876, and 0.707) showed that respondents' responses varied from one another and were generally near the mean. Every item's standard deviation falls between 0.73 and 0.87.

Table 2 displays the t-test result for the disparity in mean assessments of male and female teachers' viewpoints on how secondary school students' use of calculators affects their arithmetic

skills. The null hypothesis was not rejected as the t-test result was not statistically significant. Since the p-value of 0.050 was not lower than the 0.05 level of significance at which it was tested. Consequently, we draw the conclusion that there is no significant difference in the viewpoints of male and female teachers about how secondary school students' use of calculators affects their arithmetic skills. Their viewpoints are the same.

### Research Question 2

What are teachers' perspectives on the influence of secondary school students' use of calculators on their numerical skills based on experience?

### Hypothesis 2

The lecturers' perceived influence of secondary school students' use of calculators on their numerical skills did not significantly vary based on the experience.

Data relating to the research question 2 and hypothesis 2 are analysed and presented in Tables 3 and 4.

**Table 3**

*Respondents' Mean Ratings on the Influence of Calculator on Students' Numerical Skills Based on Experience*

S/N	Item Statements	1-3YRS			4-6YRS			7-10YRS											
		$\bar{X}$	N	Std. Dev.	$\bar{X}$	N	Std. Dev.	$\bar{X}$	N	Std. Dev.									
1	The calculator allows students efficiently solving complicated problems	3.69	29	0.471	3.80	56	0.616	3.67	15	0.816									
2	The use of calculator makes calculations less rigorous for students	3.45	29	0.632	3.25	56	0.769	2.93	15	1.100									
3	Calculators allow minimal room for errors when using mathematical formulas	3.41	29	0.733	3.21	56	0.847	3.13	15	1.060									
4	The availability of graphic calculators has made it easier for students to work with numbers	2.93	29	0.651	2.89	56	0.966	3.00	15	0.756									
5	Calculators makes it easy to convert the units of measurements	3.28	29	0.882	3.14	56	0.923	3.13	15	0.915									
6	The use of calculators hinders students' chances of learning simple mathematics operations	3.52	29	0.688	3.45	56	0.829	3.27	15	1.100									
7	The use of calculators enhance students' arithmetic skills	2.79	29	0.902	2.68	56	0.974	2.60	15	1.056									
<b>Cluster total</b>		23.07			4.959			22.42			5.924			21.73			6.803		
<b>Cluster mean</b>		3.30			0.71			3.20			0.85			3.10			0.97		

Source: Authors' own development.

**Table 4**

*Mean Ranks of the Influence of Calculator Use on Students' Numerical Skills Based on Teachers' Experience*

<b>Kruskal-Wallis Test Ranks</b>		
<b>EXPERIENCE</b>	<b>N</b>	<b>Mean Rank</b>
1-3years	29	56.81
4-6 years	56	49.06
7-10 years	15	43.67
<b>Total</b>	<b>100</b>	

Source: Authors' own development.

**Table 5**

*Kruskal-Wallis Test Statistics*

<b>Test Statistics<sup>a,b</sup></b>	
Kruskal-Wallis H	2.386
Df	2
Asymp. Sig.	0.303
a. Kruskal Wallis Test	
b. Grouping Variable: EXPERIENCE	

Source: Authors' own development.

Table 3's data demonstrates that science subject teachers with varying degrees of classroom experience concur on each of the seven categories. The mean range score for teachers with 1-3 years of experience was 2.79 to 3.69; for teachers with 4-6 years of experience, it was 2.68 to 3.80; and for teachers with 7-10 years of experience, it was 2.60 to 3.67. Among all teachers with varying degrees of experience, item one has the greatest mean score rating, while item seven has the lowest mean score rating among teachers teaching science subjects. Educators of all experience levels believe strongly that calculators assist students in successfully tackling difficult problems. The levels of 1-3, 4-6, and 7-10 experience years have cluster means that are all higher than 3.0. The Awka education zone's science subject teachers concur that calculators have an impact on students' numeracy abilities, as seen by the cluster mean of 3.07. For the levels of 1-3, 4-6, and 7-10 experience years, the cluster standard deviations are, respectively, 0.71, 0.85, and 0.97. This indicates that the respondents' evaluations are fairly close to one another. Their thoughts are similar.

Table 4 displays the average rankings of teachers' viewpoints regarding the influence of calculator use on students' numerical skills according to their level of experience and Table 5 illustrates the degree of its importance. The Kruskal-Wallis H test, which was conducted using Tables 4 and 5, revealed that there was no statistically significant difference between the teachers' perspectives on how using calculators in secondary school affects students' numerical skills depending on their experience level ( $Y^2(2) = 2.386, P = .303$ ). The mean rank perceived influence score for teachers with 1-3 years of experience was 56.81; for those with 4-6 years of experience, it

was 49.06; and for those with 7–10 years of experience, it was 43.67. Based on the current understanding, this study is the first to explore how teachers perceive students' use of calculators impacting their arithmetic abilities in the classroom, taking into account their teaching background.

### ***Research Question 3***

What are teachers' perspectives in terms of the influence of secondary school students' use of calculators on their numerical skills based on qualification?

### ***Hypothesis 3***

The lecturers' perceived influence of secondary school students' use of calculators on their numerical skills did not significantly vary based on qualification.

Data relating to this research question and hypothesis are analysed and presented in Tables 6, 7 and 8.

**Table 6**

*Teachers' Mean Ratings on the Influence of Calculator Use on Students' Numerical Skills Based on Qualifications*

S/ N	Item Statements	OND			HND			B.Ed			M.Ed			Others		
		$\bar{X}$	N	Std. Dev.	$\bar{X}$	N	Std. Dev.									
1	The calculator allows students efficiently solving complicated problems	3.71	17	0.47	3.63	19	0.761	3.77	43	0.684	3.88	16	0.342	3.8	5	0.447
2	The use of calculator makes calculations less rigorous for students	3.18	17	0.728	3.32	19	0.582	3.19	43	0.958	3.56	16	0.512	3	5	1
3	Calculators allow minimal room for errors when using mathematical formulas	2.94	17	0.966	3.37	19	0.831	3.26	43	0.902	3.38	16	0.619	3.6	5	0.548
4	The availability of graphic calculators has made it easier for students to work with numbers	2.65	17	0.862	3.16	19	0.834	3.05	43	0.899	2.56	16	0.727	3	5	0
5	Calculators makes it easy to convert the units of measurements	3.29	17	0.985	3.42	19	0.838	3.07	43	0.961	3	16	0.816	3.4	5	0.548
6	The use of calculators hinders students' chances of learning simple mathematics operations	3.24	17	0.903	3.26	19	0.991	3.56	43	0.734	3.5	16	0.894	3.6	5	0.548
7	The use of calculators enhances students' arithmetic skills	3.18	17	0.951	2.74	19	1.147	2.44	43	0.934	2.81	16	0.655	2.8	5	0.837
<b>Cluster total</b>		22.19		5.865	22.9		5.984	22.3		6.072	22.69		4.565	23.2		3.928
<b>Cluster mean</b>		3.17		0.837	3.27		0.855	3.1		0.867	3.24		0.652	3.31		0.561

Source: Authors' own development.

**Table 7**

*Mean Ranks of the Influence of Calculator Use on Students' Numerical Skills Based on Teachers' Qualifications*

<b>Kruskal-Wallis Test Ranks</b>		
<b>QUALIFICATION</b>	<b>N</b>	<b>Mean Rank</b>
OND	17	46.71
HND	19	53.63
B.Ed	43	49.55
M.Ed	16	51.31
Others	5	57.10
<b>Total</b>	<b>100</b>	

Source: Authors' own development.

**Table 8**

*Kruskal-Wallis Test Statistics*

<b>Test Statistics<sup>ab</sup></b>	
Kruskal-Wallis H	.846
Df	4
Asymp. Sig.	.932
a. Kruskal Wallis Test	
b. Grouping Variable: QUALIFICATION	

Source: Authors' own development.

The data from Table 6 indicates that among the seven items analyzed, four items show mean scores at or above 3.0, while the remaining three have mean scores at or above 2.56. These findings suggest a strong level of agreement among science teachers with varying qualifications. However, it is noteworthy that science instructors with a Bachelor of Education degree gave a mean rating of 2.44 for item 7, which falls below the 2.50 threshold. This indicates their disagreement with the statement that using calculators enhances students' mathematical abilities. Notwithstanding their qualifications, a greater number of science subject teachers in the Awka education zone agree that calculators have an influence on students' numerical skills, according to the cluster mean, which ranges from 3.10 to 3.31. Table 7 displays the average rankings of science teachers' opinions regarding the influence of calculator use on secondary school students' mathematical abilities according to their qualifications. Table 8 illustrates the significance of the influence. Based on qualifications, there was no statistically significant difference in the opinions of science teachers about how calculator use affects secondary school students' numerical skills, according to Tables 7 and 8. The Kruskal-Wallis H test revealed this, with  $Y^2(4) = .846$ ,  $P = .932$ , and mean rank perceived influence scores of 46.71 for OND teachers, 53.63 for HND teachers, 49.55 for B.Ed teachers, 51.31 for M.Ed teachers, and 57.10 for other (BSc. Ed, BA. Ed) qualifications.

## Discussion

The results of the study demonstrated that science teachers in the Awka school zone agreed that calculators could have both beneficial and negative effects on pupils' math proficiency. The findings of this study, which indicated that there was no discernible difference between the perspectives of male and female teachers regarding how the usage of calculators by secondary school students impacted their mathematical abilities, are consistent with research conducted by Mbugua et al. (2011), and Salani (2013). This study's findings corroborated those of Mbugua et al. (2011), who discovered that science instructors of all genders strongly agreed that calculators assist students in solving difficult problems rapidly, lessen the workload associated with computations, and offer minimal room for error. This study supports the findings of Desoete (2009) who found that teachers believe that using calculators in the classroom can help students develop their computational and problem-solving skills. Similarly, in Salani's (2013) study, most educators, regardless of their gender, viewed calculators as useful technical aids that would benefit their students in the future. However, they also expressed concerns that excessive reliance on calculators could hinder students' development of basic computational skills. Additionally, the study's findings demonstrated that, regardless of the instructors' degree of teaching experience, there was no statistically significant difference in the teachers' opinions about how the use of calculators in secondary school affects students' arithmetic skills. This study's results are consistent with those of Amanyi et al. (2016), who discovered that teachers believed calculators made it easier for students to change measurement units because they made it easier for them to solve mathematical and scientific problems in the classroom, despite the fact that there were few studies to the best of the researchers' knowledge to support this finding. The current study by Karadeniz (2015) aims to look at the viewpoints of the instructors when they use graphing calculators in advanced math classes. The study's findings indicated that, of the eleven math teachers, five had a high perceived attitude and experience level at first, while the other six had a medium level. According to all teachers, teaching pupils how to use a symbolic manipulator was just as necessary as teaching them how to use a graphing calculator. Regarding the use of graphing calculators by students, teachers felt that, on the whole, kids found them to be enjoyable. Teachers noted that because students could solve problems and had greater opportunities for visualization, graphing calculators had a beneficial impact on their learning. However, instructors said that the use of graphing calculators had taken away part of the meaning and had a negative impact on students' mathematical abilities. The Uniform report from the teachers is likely expected since a previous study by Eleje et al. (2022b) revealed that the majority of the secondary school teachers possessed positive attitude towards the teaching profession.

McDaniel (2020) offered an opposing perspective to the study's findings, pointing out that high school teachers appear to concur that pupils rely too heavily on calculators and that their usage of them has caused them to lose some number sense. The majority of college students believe that they learn math better without the use of calculators compared to when they are allowed to use them. Even most of the high school respondents to the study thought they would possess more mathematical aptitude if they had never been permitted to use calculators in the classroom.

Therefore, why are calculators used so frequently if all students think that using one could hinder their learning in some way? Naturally, using a calculator differs depending on the course. They ought to be a backup resource rather than the primary one. In this method, students can, ideally, absorb the information first, apply it with a calculator, and then employ that knowledge.

It is noteworthy to notice that there is no statistically significant difference in the opinions of Awka Education Zone's scientific subject instructors regarding how calculator use impacts secondary school students' numerical skills based on their degrees. Teachers of scientific subjects with a B.Ed., however, argue that students' math skills are enhanced by the use of calculators. Taley and Adusei (2020), who studied the calculator knowledge of junior high school math teachers, also found a discrepancy. The goal of the study was to find a relationship between the motivation for using calculators in the classroom and the competency of junior high school math teachers. According to the findings, almost 70% of the teachers had poor calculator proficiency. Furthermore, inexperienced or low qualified educators performed worse in the calculator-based test of proficiency. Moreover, there was a clear link between the expertise of math educators and their eagerness to integrate calculators into their teaching. These findings offer valuable insights for individuals working on updating curriculums, helping them achieve the objective of incorporating technology into math education. According to Best Places (n.d.), basic calculators can perform multiplication, division, subtraction, and addition, so the study's findings are plausible. The pupils will definitely make use of calculators. Teachers may encourage students to use calculators in the classroom, even though doing calculations using a calculator can be faster than with a pen and paper technique. Orellana-Farias and Barkatsas (2017) argued that calculators should be used in lessons to supplement and improve students' numerical abilities in the classroom, rather than replacing instruction on basic algorithms and mathematical operations.

## **Conclusions**

A calculator can be used in the classroom to help students acquire lifelong skills in addition to performing basic calculations. The results of this study indicated that proficiency in operating a scientific calculator significantly reduced the amount of time students need to apply mathematical concepts. This finding supports the notion that utilising calculators improves students' problem-solving efficiency, boosts their self-assurance when facing complex mathematical and scientific challenges, and affords them additional opportunities to refine their numerical abilities. The use of calculator can be of negative influence or positive influence to the numeracy skill of the students in secondary schools.

## **Implication of the Study**

The findings that the science subject teachers irrespective of their gender, experience and qualification agreed that calculators have positive influence on students' numerical skill implies that the use of calculators allow students to focus on the problem-solving techniques and provides increase in their motivation towards the study of mathematics and other analytical subjects in secondary schools. It also suggests that incorporating calculators in the classroom would enable

students to independently build their understanding through the investigation of mathematical concepts and procedures. Thus, the implication is that, concerted efforts must be made by science subject teachers in ensuring that the use of calculators did not weaken the students' mental skills in process of adopting calculators in the classroom.

### **Limitation of the Study**

The major limitation of this study is that the researcher could not use the entire science subject teachers in Awka education zone. In addition, private secondary school teachers in Awka education zone were excluded in this study. Another limitation encountered in the study was that some science subject teachers did not attend to the questionnaire due to personal engagements in schools as the time of this study.

### **Suggestions for Future Research**

In secondary education, teachers should encourage students to continue using calculators as a learning tool while tackling mathematical and scientific problems, as well as incorporate them into the teaching and learning process of science classes. It is recommended to use the conventional pen and paper method to improve math proficiency.

Based on the findings of this study, the following suggestions are made for further studies:

1. A comparative analysis of influence of use of calculators on the numerical skill of public and private secondary school students in Awka Education Zone.
2. The identification of the problems faced by science subject teachers in the integration of calculators in the classroom.
3. An assessment of positive and negative attitudes of science subject teachers on the use of calculators in secondary schools in Awka Education Zone.

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