

# The Impact of Prohibiting Scientific Calculators on Mathematics Learning At Las Pinas National High School Almanza

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## Abstract:

In this investigation, Grade 9 learners from Las Piñas National High School Almanza were studied to examine the impact of prohibiting the use of scientific calculators in terms of performance in mathematics, computation accuracy, problem-solving skills, and learners' perceptions. The research was a quasi-experimental design involving 90 participants who were divided into two groups: a control group that was allowed to use scientific calculators and an experimental group that was not permitted to use scientific calculators. Data were collected through a researcher-made pre-test and post-test, together with a survey questionnaire. Results indicated that both groups improved following the intervention. However, learners in the control group performed better on the post-test ( $M = 9.13$ ,  $SD = 1.972$ ) compared to those in the experimental group ( $M = 4.97$ ,  $SD = 2.115$ ). Nonetheless, non-scientific calculator users exhibited more careful stepwise solutions and were stronger in manual computation. In terms of perception, learners generally showed a neutral response to learning mathematics without scientific calculators, especially in confidence in solving problems.

The findings indicated that while scientific calculators contributed to better overall performance, limiting their use helped strengthen foundational skills and improve structured problem-solving. This supported the idea of using calculators in a guided and balanced manner in mathematics instruction. Results indicated that both groups improved following the intervention. The learners in the control group performed better on the post-test with a mean score ( $M = 9.13$ ,  $SD = 1.972$ ) than the experimental group ( $M = 4.97$ ,  $SD = 2.115$ ). The learners prohibited from using scientific calculators worked on more methodical step-by-step solutions and were drilled in manual computation. The learners exhibited a neutral perception of learning mathematics without scientific calculators, particularly in confidence in solving problems. These results suggested that while scientific calculators were beneficial to overall performance, prohibiting their use aided in creating a more solid foundation of skills and an enhanced ability for structured problem-solving. This suggested the need for a balanced and guided use of scientific calculators during mathematics class.

**Keywords:** scientific calculators, mathematics performance, computational accuracy, problem-solving ability, learners' perception, quasi-experimental design

## I. INTRODUCTION

The development of mathematics teaching in the twenty-first century still depended on the development of technology and the rapid rate of change (as was the case with the widespread use of scientific calculators in education). Scientific calculators became imperative devices that formed the foundation of mathematics

learners in terms of the efficiency and accuracy of completing complex calculations. Numerous articles warned that the use of technology could hinder learners from being able to do mental calculations and make them become completely reliant on their scientific calculators, as Padi (2020) and Abdul Rahman et al. (2022) highlighted.

A review of the literature showed that some newer research had been carried out in this dispute between traditional computation and the use of a scientific calculator in learning mathematics. Technological tools provided time-saving and higher engagement; however, prolonged use affected the ability of learners to remember simple computational procedures negatively (Over-Reliance on scientific Calculators, 2024; Nob and Pañares, 2025). In the Philippines, learners became dependent on scientific calculators for problem solving that could be solved mentally or on paper. Classroom teachers described that even operations in the elementary level had become challenging for most learners without the aid of a device (Balantes and Tonga, 2020). Consequently, research and educational communities launched studies on the benefits of limited scientific calculator use for enhancing computational fluency. Barba et al. (2024) and Igcasama et al. (2023) suggested that learners who were involved in repeated calculations gained a better understanding of underlying relationships in mathematics and improved their accuracy in problem-solving skills. With that in mind, it could be said with full confidence that using scientific calculators with caution under careful instruction positively reinforced the learner's knowledge and computation skills.

Despite the increasing international interest, there was still little research from a Philippine educational standpoint across the junior high school years. Few investigations focused on the accuracy, performance, and motivational factors of learners when the use of scientific calculators was prohibited in the classroom. This research helped to fill this gap by examining the impact of such prohibition on a sample of Grade 9 learners at Las Piñas National High School Almanza in terms of achievement in mathematics, accuracy in calculation, and attitude toward mathematics.

The purpose of the study was to provide information that helped instructors balance technological support with skill development, as well as to inform policymakers about whether or not prohibiting the use of scientific calculators increased the mathematical understanding of the learners or acted as a barrier by increasing the cognitive demand. By comparing the learning of learners who used scientific calculators and those who did not, the study aimed to inform future teaching practices and assessments to promote learning efficiency as well as deep understanding in mathematics learning.

## II. METHODOLOGY

This study applied both quasi experimental and descriptive designs to examine how the use of scientific calculators influenced learners' performance in mathematics. The quasi-experimental approach compared two groups of learners, one group was allowed to use scientific calculators while the other group was not, and both groups followed the same lessons, making it possible to observe differences in their results based on the given condition. Pretest and posttest scores were used to determine changes in performance. At the same time, a descriptive approach was included to understand learners' perceptions through a survey that used a Likert scale, which measured their views on how scientific calculators affected their understanding, confidence, and problem solving. Using both approaches allowed the researcher to examine not just the learners' results but also their personal views and experiences, which gave a deeper understanding of how the use of calculators influenced their learning in an actual classroom setting.

This study was carefully designed to follow ethical standards and protect the well-being of all participants. The first step involved coordinating with the school administration of Las Piñas National High School

Almanza to ensure that the purpose of the study was properly explained to the learners and that they understood their participation was completely voluntary. They were also informed that they could withdraw at any time during the study and that their identities would remain anonymous in all reported data.

To ensure fairness during data collection, both the control and experimental groups were given the same learning condition. They were taught the same lessons, guided by the same teachers, given equal time for instruction, and assessed using the same evaluation tools. The only difference between each group was the use or prohibition of scientific calculator use. This ensured that all learners were treated fairly and that no group experienced any disadvantage, while remaining consistent with the prescribed curriculum. In addition, the study upheld careful and responsible handling of all data to ensure that the results truthfully represented the learners' actual performance.

### III. RESULTS AND DISCUSSION

This section presents findings on mathematics, calculation ability, and perception of the selected Grade 9 learners on whether scientific calculators were allowed or not. The findings presented were in conjunction with the following: Mathematics performance of selected grade 9 learners in control and experimental group before and after the prohibition of scientific calculator, Significant difference in the mathematics achievement in the students who are allowed to use scientific calculators and those who are prohibited to use a scientific calculator, Perceived Effect of prohibiting scientific calculator on learners' accuracy and computational ability in solving mathematical problems, and Perception of selected grade 9 students in the experimental group toward learning mathematics without the use of scientific calculator.

**Table 1: Mathematics Performance of Control and Experimental Group before and after allowing and prohibiting the use of scientific calculator**

Groups	Mean ( $\bar{x}$ )	Standard Deviation
Allowed (Before)	3.06	2.280
Allowed (After)	9.13	1.972
Prohibited (Before)	2.17	2.014
Prohibited (After)	4.97	2.115
N = 45		

Table 1 shows the pre-test and post-test mean scores and standard deviations of the mean scores of both the Allowed and the Prohibited groups, which had a balanced 45 learners in each group.

In the pre-test, the results of the mean scores of both groups showed that the level of understanding of both groups towards the mathematics concepts covered in the test was low. The mean scores were low in the Allowed group with an average of 3.06 (SD = 2.280), and in the Prohibited group with an average of 2.17 (SD = 2.014).

The findings showed that the performance of the two groups improved after the intervention. The Allowed group performed better with a mean score of 9.13 (SD = 1.972). Another improvement was also recorded in the Prohibited group in which the mean score was 4.97 (SD = 2.115). Although there was a significant amount of recorded improvement in the performance of both groups, there was a high difference in means between the two groups. The Allowed group had the chance to perform better when it came to the mean

score compared to the Prohibited group. These findings indicated that there were positive results with the usage of scientific calculators.

This study was in line with findings of a study (Li et al., 2023), wherein it further demonstrated the relationships of learners with mathematics and how a calculator could also lead to poor perception skills and lesser calculating mobility.

**Table 2: Difference in the Mathematics Performance of Those Allowed and Prohibited to Use Scientific Calculator**

Groups	Mean Difference	SD	T	Df	P-value	Decision	Interpretation
Allowed (before and after)	-6.06	1.629	-24.978	44	< .001*	H <sub>0</sub> rejected	Significant
Prohibited (before and after)	-2.80	2.106	-8.918	44	< .001*	H <sub>0</sub> rejected	Significant

Table 2 shows that both groups had higher levels of math performance following the intervention. Participants who were permitted to use scientific calculators showed a significantly larger gain in scores (MD = -6.06, SD = 1.629;  $t = -24.978$ ,  $p < .001$ ), and the group prohibited from using scientific calculators improved as well in smaller amounts (MD = -2.80, SD = 2.106;  $t = -8.918$ ,  $p < .001$ ). The results were statistically significant in both instances at the .05 level of significance.

The findings of this study suggested that both of the techniques used by the learners improved their performance; however, based on the calculations, there was significant evidence that to the conclusion that learners using scientific calculators are able to complete their tasks quicker than learners who did not have scientific calculators and had more time to pay attention to how they interpreted the problem and the process of how they solved the problem. Learners who did not have scientific calculators did improve their understanding of the complete problem-solving process, but to a lesser degree than learners who used scientific calculators, because they were more adept at accomplishing their tasks with scientific calculators than without scientific calculators.

This result aligned with earlier research that found structured scientific calculator use could support learners' performance and engagement in mathematics (Cheong et al., 2025). Moreover, research has demonstrated that it is possible to develop higher-order thinking skills through proper guidance in the use of scientific calculators (Leong, 2025). The prohibition using the scientific calculator also showed the importance of improving the computation skills of the students, which could help partly explain the better performance of the group that was not allowed to use scientific calculators (Li, 2023).

**Table 3: Perceived Effect of Prohibiting Scientific Calculator on Experimental Group's Accuracy and Computational Ability**

Indicator	WM	SD	Interpretation
1. I can solve difficult math problems correctly without	2.47	1.120	Disagree

using a scientific calculator.			
2. I carefully check my steps when I do math problems by hand.	3.93	1.074	Agree
3. Practicing math without a scientific calculator helps me get better at solving problems.	3.20	1.235	Neutral
4. I make fewer mistakes when I calculate answers by myself.	3.44	1.216	Agree
5. I can find the correct answer even if I don't use a scientific calculator.	2.71	1.217	Neutral
<b>Average Weighted Mean</b>	<b>3.15</b>	<b>.707</b>	<b>Neutral</b>

Table 3 shows that the evidence uncovered indicated a generally low to moderate perceived effect of being forbidden from the use of scientific calculators on the accuracy and computational ability of learners (AWM = 3.15). Thus, the effect of the intervention was rather mixed rather than a direct positive or negative one. Particularly, learners noticed that it helped them check their steps more carefully (WM = 3.93) and avoid mistakes (WM = 3.44), showing a positive effect on both procedural accuracy and careful computation. However, learners showed doubt and insecurity in their own computational skills when asked if they could solve equations without the educational aid of a scientific calculator, and expressed that they believed they would struggle with getting the correct answers (WM = 2.71), suggesting only a minor positive effect on confidence and higher-order problem-solving ability.

These findings confirmed the notion that manual computation built foundational skills but did not guarantee learners' ability to independently solve complex problems. Regular practice in a manual computation reinforces procedural fluency and long-term retention of mathematical processes (Adams & Bracey, 2024). Likewise, Hurrell (2021) asserted that conceptual and procedural knowledge should be developed simultaneously for successful learning. However, Leong (2025) and Cheong, Zulkifli & Li (2025) found that through guided utilization of scientific calculators, higher-order thinking skills could improve, as well as learners' confidence in completing more complicated mathematical tasks.

Additionally, Wan (2024) stated that prohibiting calculators too much may have created cognitive overload for learners and reduced the amount of working memory used for solving problems. These supported the current results, with learners becoming more accurate but uncertain on harder problems. Thus, these results suggested that the prohibition of scientific calculators strengthened accuracy and calculation processes positively yet moderately impacted problem-solving ability and confidence, reiterating the importance of an appropriate approach to calculator use in teaching mathematics.

**Table 4: Experimental Group’s Perception on Learning Mathematics Without the Use of Scientific Calculator**

Indicator	WM	SD	Interpretation
1. I feel more confident in math when I do not use a scientific calculator.	2.93	1.338	Neutral
2. Solving math problems without a scientific calculator helps me think carefully about the steps.	3.66	1.167	Agree
3. I enjoy the challenge of solving math problems without a scientific calculator.	3.11	1.265	Neutral
4. Learning math without a scientific calculator makes me want to practice more on my own.	3.44	1.271	Agree
5. I believe not using a scientific calculator helps me understand math better.	3.20	1.198	Neutral

<b>Average Mean</b>	<b>Weighted</b>	<b>3.27</b>	<b>.828</b>	<b>Neutral</b>
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Table 4 reveals the beliefs of learners in the experimental group towards learning mathematics without the aid of a scientific calculator. The final result was neutral, as evidenced by the overall average weighted mean of 3.27 (SD = 0.828), which signified that learners neither strongly agreed nor disagreed with whether learning without calculator support was effective.

Looking at the individual indicators, learners had a neutral confidence score (WM = 2.93, SD = 1.338) when solving mathematics without a scientific calculator, suggesting they were not entirely confident in this aspect of their math skills. However, they agreed that working without a scientific calculator fostered more careful thinking about each step while solving problems

(WM = 3.66, SD = 1.167), pointing to increased attention to the problem-solving process. They also agreed (WM = 3.44, SD = 1.271) that learning without a scientific calculator motivated practice at home. However, learners showed indifference when asked about enjoyment in solving problems without a scientific calculator (WM = 3.11, SD = 1.265) and whether solving problems without a scientific calculator improved their understanding of mathematics in general (WM = 3.20, SD = 1.198).

These results suggested that while learners saw disadvantages to learning without a calculator, including lack of focus and motivation to practice, they still were unsure about the effect on their confidence and general understanding. Studies found that structured learning experiences led to improved levels of learners' engagement and participation (Zulkifli & Li, 2023). Furthermore, research on the transference of higher-order thinking skills indicated that these required guided instruction and active engagement to develop counterpart skills rather than the simple absence of technological apparatus (Leong, 2025). This meant that prohibiting calculator use could be helpful with adequate instructional guidance.

#### **IV. CONCLUSIONS**

This study examined the impact of the non-use of scientific calculators on Grade 9 learners' mathematics performance, computational ability, and attitudes at Las Piñas National High School Almanza.

Both groups showed improvement in mathematics performance after the intervention, indicating that the instructional strategies used remained effective despite different circumstances. However, learners who were allowed to use scientific calculators achieved higher conceptual knowledge compared to those who were restricted.

The allowed group showed greater strides in their learning and further demonstrated that the guided use of scientific calculators could enhance accuracy and efficiency in solving mathematical problems, while relying solely on restrictions led to limited potential. These findings implied that when used within the confines of a structured outline, scientific calculators could improve speed and accuracy, while restriction alone produced modest gains.

The prohibition of scientific calculators led learners to become more deliberate and careful with the process; however, it also showed a significant decrease in learners' confidence over time.

The learners expressed a neutral attitude toward learning mathematics without the use of a scientific calculator. Although they noticed some benefits, such as better focus while working through problem-solving and increased practice time, they questioned whether it was truly better for them overall, as it also led to a decrease in confidence.

Learners were encouraged to practice both methods of solving in order to strengthen their computation skills as well as improve their attitudes toward mathematics. The results indicated that blending structured manual calculation followed by balanced scientific calculator use was a more powerful contributor to improving learners' mathematics performance.

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### COMPETING INTERESTS

The authors declares that there are no financial or personal relationships that could have influenced the work reported in this study. The authors further confirm that no competing interests exist.

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