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Symbolab-Assisted Instruction and Its Effect on Students' Math Performance

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Abstract. This action research aimed to investigate the impact of Symbolab-assisted instruction on the numeracy skills of Grade 7 students in integer operations. Challenges in mathematical competency, particularly in integers, can hinder the students' progression in more advanced mathematics. This study aimed to evaluate the effectiveness of incorporating Symbolab, an AI-powered problem-solving tool, in improving students' numeracy skills. Using a time series design, a pretest-posttest approach was implemented over five consecutive days, measuring students' numeracy skills before and after the intervention. The results revealed a significant improvement in students' scores, with several moving from a failing to a passing status, $\chi^2(1, N = 14) = 5.440$, $p = 0.020$. Additionally, the posttest scores were significantly higher than the pretest scores ($W = 19.000$, $p = 0.018$). These findings demonstrate the effectiveness of Symbolab-assisted instruction in enhancing numeracy performance, reinforcing mathematical concepts, reducing cognitive load, and fostering student engagement. The study suggests that digital tools such as Symbolab can significantly improve learning outcomes by providing structured solutions, immediate feedback, and personalized learning experiences. The results also highlight the importance of integrating technology into mathematics instruction to bridge numeracy gaps and foster a deeper understanding of mathematics. Future research should investigate the long-term effects and scalability of these digital tools across various grade levels and mathematical domains.

Keywords: Symbolab; Numeracy skills; Integer operations; Time series design; AI-powered tools; Mathematical competency

1.0 Introduction

The current educational landscape reveals a persistent struggle with mathematics among middle and high school students, which raises concerns about their readiness for advanced studies and the workforce, as gaps in foundational numeracy hinder their ability to grasp complex concepts (Seah & Booker, 2005). Steen (1990) highlights that globally, innumeracy exacerbates societal inequities such as illiteracy. The Philippines' performance in international assessments, such as PISA, and difficulties with integer operations further emphasize the need for improved instruction (Lopez, 2022). Concurrently, the CEM Standardized Test during the 2023-2024 school year revealed below-average numeracy skills among 128 Grade 7 students, with none achieving an excellent level (CEM, 2023).

Furthermore, outdated pedagogy, limited resources, and weak technology integration impede learning in algebra and trigonometry (Paulin & Jean Baptiste, 2023; Qurohman, 2024). The lack of systematic Project-Based Learning (PjBL) materials and ineffective traditional instruction heighten these issues (Rosyida et al., 2024;

Lopez, 2022). To address these gaps, recent studies have emphasized the value of project-based learning (PjBL) and digital tools, such as Symbolab, which provide step-by-step problem-solving support and foster conceptual understanding (Rosyida et al., 2024; Makhdum et al., 2023).

To combat these challenges, digital tools in mathematics education can help enhance engagement, provide immediate feedback, and personalize instruction, which makes complex concepts more accessible. As demonstrated by Tubola et al. (2023) and Tabing (2023), AI-powered tools like Symbolab can improve foundational numeracy skills, foster active participation, and address instructional gaps. Research also suggests that Symbolab and PjBL materials enhance engagement and conceptual understanding (Makhdum et al., 2023; Rosyida et al., 2024). However, research on the use of Symbolab in the Philippine context remains scarce.

The integration of digital tools into mathematics education has become a significant trend in modern teaching and learning practices. These tools have the principal purpose of enhancing student engagement, providing immediate feedback, and offering personalized learning experiences that cater to diverse needs and learning styles. Platforms like Symbolab, which provide interactive problem-solving features and step-by-step instructions, exemplify the potential of technology to make complex mathematical concepts more accessible and comprehensible. By fostering active participation and reducing barriers to understanding, these tools are increasingly used to address challenges in teaching foundational topics, such as integers and numeracy skills. As education systems worldwide emphasize 21st-century skills, the role of digital platforms in developing mathematical proficiency and critical thinking continues to grow. Research into the efficacy of these tools is crucial to understanding their impact on student outcomes and informing their effective integration into classroom practice.

Despite these tools, challenges remain. According to Tabing (2023), error analysis reveals that incorrect algorithms and multi-step processes can overload working memory, leading to misconceptions. To address these challenges, researchers advocate for broader curricula, mobile numeracy games, and AI-powered learning tools (Steen, 1990; Lopez, 2022; Rosyida et al., 2024). Additionally, integrating PjBL-based worksheets and targeted interventions can enhance educational transitions and conceptual understanding (Seah & Booker, 2005; Paulin & Jean Baptiste, 2023; Makhdum et al., 2023).

Overall, this study aimed to fill the gap by evaluating the effectiveness of Symbolab–assisted instruction through the analysis of pre- and post-intervention scores, providing insights into the impact of AI-powered tools on student performance. Findings offer data-driven guidance for integrating technology into mathematics instruction, supporting evidence-based practices to improve conceptual understanding, numeracy skills, and overall mathematical proficiency in the digital age.

2.0 Methodology

2.1 Research Design

This action research employs a time series design, a methodological approach that involves repeated measurements over time, to systematically investigate and refine instructional strategies aimed at improving students' integer computation skills. This design complements the iterative and cyclical nature of action research, as outlined by Fraenkel et al. (2012), enabling educators to address specific educational challenges through systematic inquiry, intervention, and reflection. The study focuses on evaluating the impact of Symbolab-assisted instruction on the numeracy skills of seventh-grade students in a specific school context.

2.2 Research Procedures and Statistical Analyses

The researchers' first goal in this study is to investigate the elements that contribute to students' challenges with numeracy. They conduct a review of existing research, consult with teachers, and analyze school records to gain a comprehensive understanding of the issue. Existing data from the CEM Standardized Test on Grade 7 students' numeracy skills show that none of them achieved an excellent level. Contextually, and to establish a baseline measurement, the researchers administer a pretest over five consecutive days to assess the students' skills in addition, subtraction, multiplication, division of integers, and the PEMDAS rule.

Following the pretest, the researchers implement a plan to improve students' numeracy skills using Symbolab, a tool that provides step-by-step solutions, practice exercises, and personalized feedback. Symbolab is used for five days to help students master integer operations and the PEMDAS rule, hence improving their mathematical abilities.

After the Symbolab intervention, the researchers administered a posttest over another five school days, designed to mirror the pretest for direct comparison. To analyze the results, they employ the McNemar test and use the moving average model to identify trends in the scores. These statistical methods allow the researchers to determine whether there have been significant changes in students' mathematical abilities and assess the measurable impact of Symbolab. The researchers then interpret the findings, considering both the numerical data and practical implications, before suggesting potential modifications for future interventions or areas for further research. Finally, the study's outcomes are compiled into a comprehensive report.

This intervention was implemented within a strict 15-day timeline, divided into five days for pretesting, five days for Symbolab-supported instruction, and five days for posttesting. This time frame adhered to the Department of Education's curriculum guide for Grade 7 mathematics, which allocates limited periods for the coverage of integers and order of operations (Department of Education, 2022). As such, the researchers were unable to extend the duration without disrupting the mandated pacing. The short-term structure of this study is supported by time series design principles, which are commonly used in education to evaluate interventions over brief, structured periods (Fraenkel, Wallen, & Hyun, 2012). Moreover, McGrath et al. (2015) argue that even within limited instructional windows, measurable learning gains can be observed if the intervention is focused and targeted. Thus, while the intervention was brief, the design is methodologically sound and consistent with curriculum and research-based constraints.

Students' scores are selected through purposive sampling based on the following criteria: (1) enrollment in Grade 7, (2) completion of all pretests and posttests, and (3) active engagement with Symbolab during classroom instruction. Of the 30 students in the class, 14 met the inclusion criteria.

Furthermore, the researchers arbitrarily applied a 50% pass-fail scheme to determine students' pre- and post-test results, establishing it as the threshold for measuring academic performance improvements. A 50% pass-fail threshold is widely used in educational institutions as a conventional benchmark for determining minimum competency (CBSE, 2021; Guskey, 2011). This aligns with criterion-referenced grading, where students must demonstrate foundational understanding to progress (Sadler, 2005). The threshold is also supported by Cognitive Load Theory, which suggests that students scoring below 50% may not have adequately processed essential information (Sweller, 1988). Additionally, Constructivist Learning Theory emphasizes ensuring basic competence before advancing, reinforcing the validity of this benchmark (Vygotsky & Cole, 1978). Statistically, a 50% cutoff provides a clear division between passing and failing, making it a valuable benchmark for performance analysis in educational research (McGrath et al., 2015). While some argue that grade thresholds can be arbitrary (Brookhart, 2013), the 50% standard remains a practical and widely accepted measure of academic achievement.

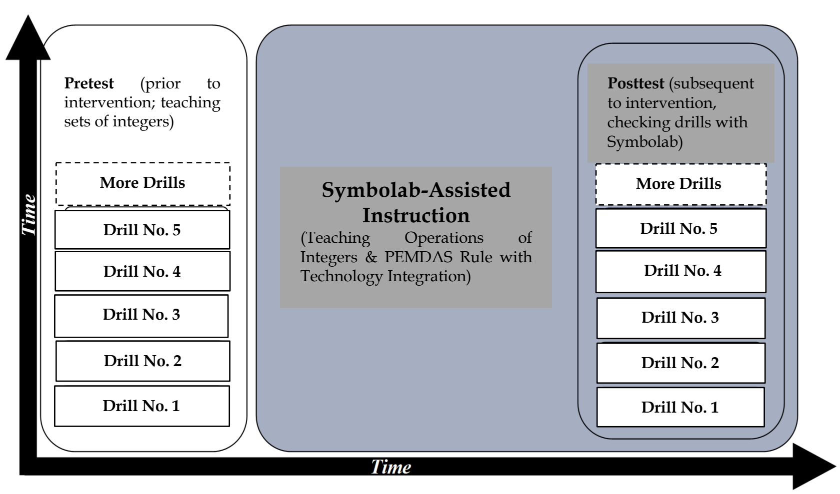

Figure 1. *Symbolab-Assisted Instruction Implementation Plot*

Figure 1 illustrates the Symbolab-assisted instructional approach over time, where students complete a sequence of drills before instruction, engage in technology-integrated learning on integer operations and the PEMDAS rule, and then complete posttest drills verified using Symbolab.

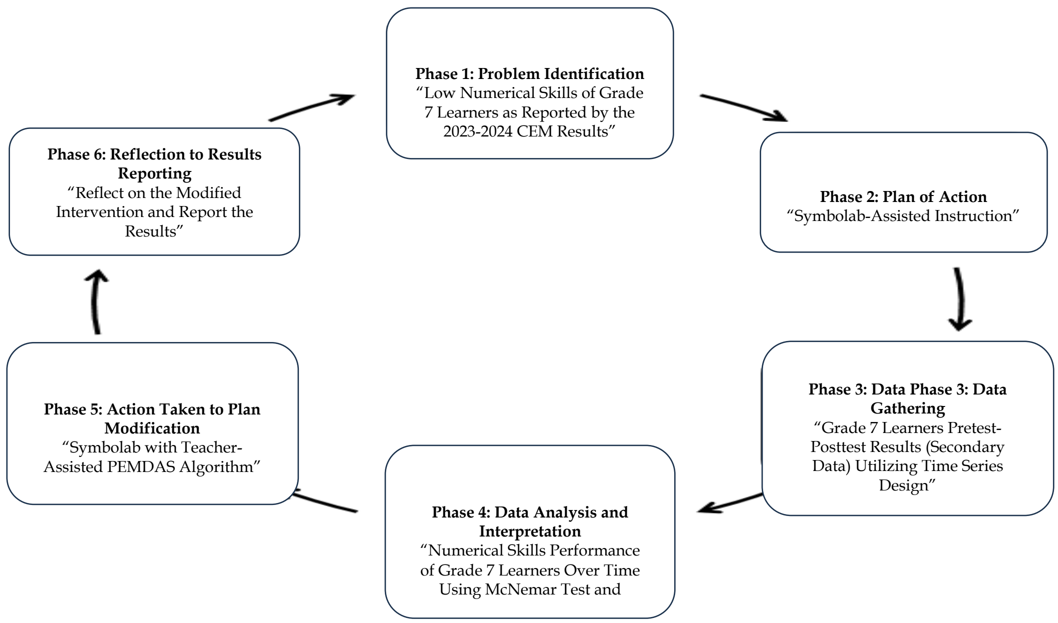

Figure 2. *Time Series-Based Six-Phase Action Research Model*

Figure 2 shows the cyclical action research process structured into six distinct phases: (1) Problem Identification; (2) Plan of Action; (3) Data Gathering; (4) Data Analysis and Interpretation; (5) Action Taken to Plan Modification; and (6) Reflection to Results Reporting (Fraenkel et al., 2012).

2.3 Ethical Considerations

This study prioritizes ethical standards, particularly in the use of secondary data. Access to student performance data is obtained with appropriate permissions from the institution, ensuring compliance with relevant policies and regulations. To protect participant confidentiality and anonymity, all student records are de-identified, and the data are used solely for research purposes, with no modifications that could compromise the integrity of the findings. Ethical approval for this study was obtained from the relevant review board, ensuring adherence to guidelines for the responsible handling of secondary data.

Furthermore, strict adherence to the Data Privacy Act of 2012 (Republic Act No. 10173) is maintained to ensure the confidentiality of participant data. Identifiable information is excluded from the final report, and all data are treated with the utmost care to protect the privacy and rights of the participants. Only aggregate data are presented, ensuring that individuals cannot be identified or linked to specific results. This study upholds high ethical standards, ensuring transparency and the protection of sensitive information throughout the research process. The University of San Agustin - Research Ethics Review Committee (USA-RERC) issued ethical clearance under protocol code 2024-162-PROFESSIONAL.

3.0 Results and Discussion

The results of this study highlight the impact of Symbolab-assisted instruction on students' numeracy skills, particularly in integer operations. By analyzing pre- and post-intervention scores, performance trends, and learning gains over multiple drills, this section provides insights into the effectiveness of AI-powered tools in mathematics education. The findings offer valuable evidence for integrating digital platforms to enhance conceptual understanding and address learning gaps.

Table 1. *Post- Against Pre-Intervention Numeracy Scores*

Numeracy Scores	*f*	*SD*	*M*	*W*	*p*
Pretest	14	2.00	5.64	19.000*	0.018
Posttest	14	1.41	6.67		

*p<0.05 is significant

The results in Table 1 reveal a significant increase in students' numeracy scores from the pretest (*M = 5.64, SD = 2.00) to the posttest (M = 6.67, SD = 1.41), demonstrating improved mathematical performance following* the intervention. The Wilcoxon signed-rank test yielded *a W of 19.000, with a p-value of 0.018, indicating that the posttest scores were significantly higher than the pretest scores* (p < 0.05). Consequently, the null hypothesis (H_0: $\bar{x}pretest \geq \bar{x}posttest$) was rejected, providing sufficient evidence that Symbolab-assisted instruction effectively enhanced students' numeracy skills. These findings suggest that the intervention had a positive impact on mathematical competency, reinforcing the benefits of AI-powered tools in supporting numeracy development.

The results, indicating a notable improvement in students' numeracy scores from the pretest to the posttest, highlight several advantages and potential limitations of Symbolab-assisted instruction. One clear advantage is the reduction in score variability, suggesting more consistent student performance and improved understanding across the group. This reflects the tool's ability to scaffold problem-solving and promote mathematical confidence. However, the relatively modest increase in the mean and the remaining variability suggest that while effective, the intervention may not equally benefit all students, particularly those with lower initial skill levels or limited digital literacy. The implications of these findings emphasize the potential of AI-powered tools like Symbolab to enhance numeracy development when integrated with guided instruction, but they also underscore the need for differentiated support to address varying student needs and ensure equitable learning outcomes.

The findings highlight a significant improvement in students' numeracy skills through Symbolab-assisted instruction, reinforcing the effectiveness of AI-powered tools in mathematics education (Sweller, 1988; Vygotsky, 1978). Research supports the use of digital platforms for enhancing engagement, scaffolding, and individualized learning (Flavell, 1979; Steen, 1990). Performance gains align with grading and assessment frameworks emphasizing meaningful learning benchmarks (Brookhart, 2013; Guskey, 2011; Sadler, 2005). AI-driven tools improve integer operations by addressing conceptual gaps and enhancing computational accuracy (Lopez, 2022; Paulin & Jean Baptiste, 2023; Qurohman, 2024). Studies further confirm their role in fostering problem-solving and mathematical comprehension (Makhdum et al., 2023; Rosyida et al., 2024; Tubola et al., 2023), supporting the use of AI-assisted platforms as effective interventions for numeracy.

Entirely, Symbolab-assisted instruction led to a significant increase in students' numeracy scores, as reflected in their improved post-intervention performance. The noticeable gains in integer operations and problem-solving skills confirm the effectiveness of AI-powered tools in enhancing mathematical proficiency over time.

Table 2. *Pretest and Posttest Results with McNemar Test Analysis: Failed-Passed Outcomes and Projection*

		Posttest			McNemar Test		
Pretest		**Failed**	**Passed**	**Total**	χ^2	*df*	*p*
Failed	*f*	1	5	6	5.440*	1	0.020
	%	16.70	83.30	100.00			
Passed	*f*	0	8	8			
	%	0.00	100.00	100.00			
Total	***f***	**1**	**13**	**14**			
	%	**7.10**	**92.90**	**100.00**			

*p<0.05 is significant

The results in Table 2 indicate that Symbolab-assisted instruction significantly improved students' numeracy skills over time, as evidenced by a notable increase in pass rates from 57.1% in the pretest to 92.9% in the posttest. Among those who initially failed, 83.3% (5 out of 6) successfully transitioned to passing, while all students who passed the pretest maintained their status. The McNemar test results, $\chi^2(1, N = 14) = 5.440, p = 0.020$, confirm that this improvement is statistically significant, suggesting that the intervention effectively enhanced mathematical understanding. These findings demonstrate that Symbolab's AI-powered step-by-step solutions and interactive learning strategies contributed to the sustained development of numeracy skills, reinforcing the tool's potential for broader educational applications.

Moreover, a post-hoc power analysis on the PISA 2022 mathematics data indicates compelling statistical strength behind the observed educational gap in the Philippines. With only 16% of 15-year-old Filipino students achieving at least Level 2 proficiency in mathematics—substantially lower than the OECD average of 69%—the parameters (*a = 0.05, n = 14) yielded* a post-hoc power of 86.6%, exceeding the conventional 80% threshold. This high level of power affirms that the study was well-equipped to detect the proficiency disparity, lending greater confidence that the result is not an artifact of chance but reflects a substantive divergence in performance.

Such statistical validation underscores the urgent need for evidence-based educational reform. The confirmation of a significant proficiency shortfall necessitates comprehensive policy responses—ranging from curriculum enhancements and teacher development to targeted resource allocation—to address the structural challenges affecting mathematics literacy. Within this context, Symbolab-assisted instruction offers notable advantages in enhancing students' numeracy skills, as evidenced by the significant increase in pass rates and the statistical support of the McNemar test. The intervention's effectiveness is further highlighted by improvements in mean scores and a reduction in standard deviation, suggesting not only overall progress but also more consistent performance among students. These results suggest that the use of AI-powered, step-by-step solutions supports differentiated learning and enhances mathematical comprehension, aligning with the call for reforms that prioritize practical instructional innovations. Nonetheless, a potential drawback is the risk of students becoming overly dependent on the tool, which could limit the development of independent problem-solving skills. Furthermore, while Symbolab benefits students with a foundational understanding, it may not fully address the needs of those who struggle with conceptual grasp unless supplemented with teacher guidance. Hence, while Symbolab can be a practical support for numeracy instruction, its integration should be strategically balanced with pedagogical approaches that strengthen critical thinking and conceptual mastery, thereby addressing the broader systemic challenges evidenced by large-scale assessments such as PISA.

This improvement aligns with cognitive and metacognitive learning principles, which emphasize the role of guided problem-solving and scaffolding in skill development (Flavell, 1979; Sweller, 1988; Vygotsky, 1978). AI-powered tools like Symbolab provide step-by-step solutions, reducing cognitive load and reinforcing conceptual understanding, which leads to sustained numeracy gains (Makhdum et al., 2023; Paulin & Jean Baptiste, 2023; Qurohman, 2024). These findings underscore the effectiveness of digital learning interventions in promoting mathematical proficiency and achieving positive learning outcomes (Brookhart, 2013; Guskey, 2011; Sadler, 2005; Lopez, 2022; Rosyida et al., 2024). Essentially, Symbolab-assisted instruction significantly improved students' numeracy skills over time by facilitating the transition of struggling students to passing status and enhancing overall mathematical proficiency. The step-by-step problem-solving approach and AI-driven support helped reduce cognitive load, reinforcing conceptual understanding and long-term skill retention.

Figure 3 illustrates the juxtaposition of pretest and posttest results using a moving average model with linear forecasting. The moving average smooths out fluctuations to reveal trends, while linear forecasting projects these trends, providing insights into the impact of the intervention on students' numeracy skills. The trend in students' numeracy scores over multiple time points reveals a steady improvement, with a more pronounced increase in posttest scores compared to pretest scores. Figure 4 shows that pretest scores started at 5.14 in Drill 1 and gradually rose, with the most significant gain occurring in Drill 3, where scores increased from 5.57 to 7.00 in the posttest. By Drill 5, posttest scores peaked at 7.36, demonstrating sustained progress. The moving average and linear trend lines confirm this positive trajectory, with the posttest exhibiting a steeper upward slope, indicating cumulative skill development. The sharp improvement in Drill 3 suggests the impact of specific instructional strategies, emphasizing the role of structured, repeated practice in enhancing numeracy performance over time.

This aligns with research on metacognition and cognitive load, which emphasizes the role of guided instruction and scaffolding in enhancing learning outcomes (Flavell, 1979; Sweller, 1988; Vygotsky, 1978). The observed gains support studies highlighting the benefits of AI-assisted learning tools, such as Symbolab, in improving problem-solving skills and mathematical proficiency (Makhdum et al., 2023; Paulin & Jean Baptiste, 2023; Qurohman, 2024). Furthermore, the impact of structured assessments and feedback on numeracy development is consistent with best practices in educational evaluation and grading (Brookhart, 2013; Guskey, 2011; Sadler, 2005).

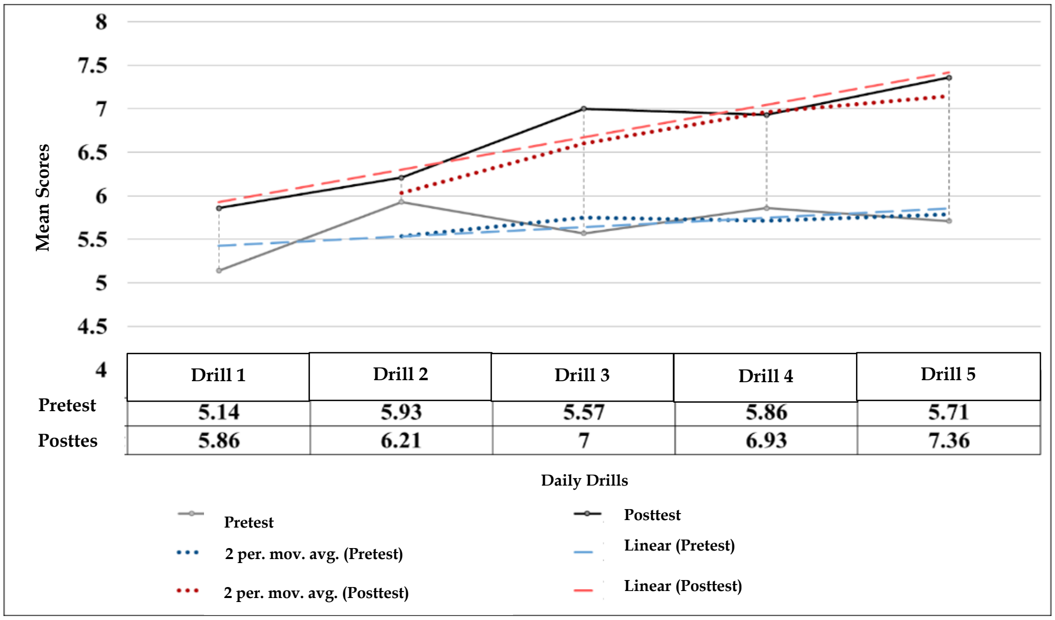

Figure 3. *Moving Average Model with Linear Forecasting: Juxtaposition of Pretest and Posttest Results*

Entirely, students' numeracy scores showed a steady improvement over time, demonstrating the effectiveness of structured, AI-assisted instruction. This trend aligns with research on metacognition, cognitive load, and assessment practices, highlighting the role of guided learning and technological tools in enhancing mathematical proficiency.

Symbolab with Teacher-Assisted PEMDAS Algorithm

The teacher consistently analyzed students' scores after each drill during both the pre-test and post-test phases to monitor learning progress and identify areas needing improvement. In the post-test, which was conducted using Symbolab, this analysis became particularly insightful, as it allowed the teacher to assess not only the students' numerical performance but also their ability to navigate and interpret AI-generated solutions. By comparing results across drills, the teacher observed patterns in skill development, pinpointed persistent misconceptions, and adjusted instruction accordingly. This ongoing assessment process ensured that Symbolab was not merely a computational aid but a tool integrated into reflective teaching practice, supporting targeted feedback and informed instructional decisions.

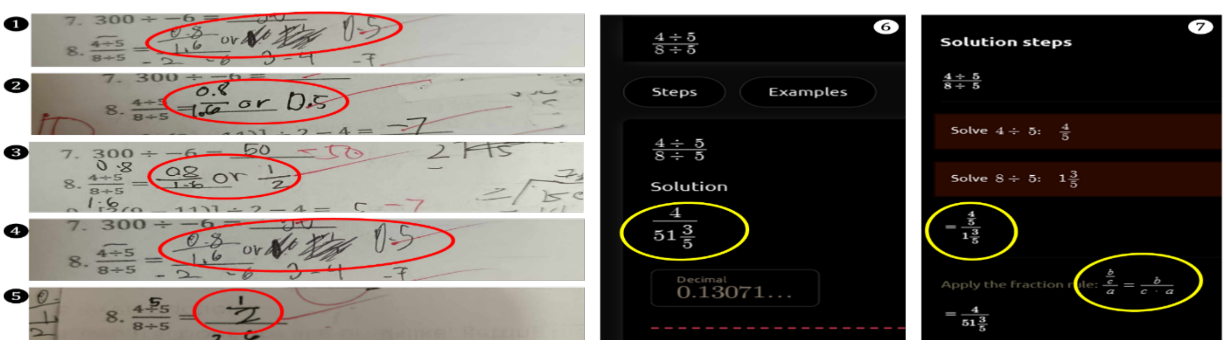

Figure 4. *Reflection on Students' Answers by Manual Computation Versus Symbolab Solution Steps*

During Drill 3 of the posttest, however, the students identified errors in the solutions generated by Symbolab, highlighting limitations in the tool's automated problem-solving process (see figure 4). Specifically, Symbolab misapplied the order of operations, leading to incorrect outputs. Recognizing this, the teacher intervened by applying the "Symbolab with Teacher-Assisted PEMDAS Algorithm" to correct the solution, which not only resolved the immediate confusion but also deepened students' understanding of the mathematical process. This incident served as a valuable learning moment, emphasizing the importance of critical thinking and not relying solely on technology for answers. It reinforced the responsible use of AI tools in education, showing that while such platforms can enhance learning, they must be used in conjunction with teacher guidance and student discernment. The experience also encouraged students to verify and question digital outputs, fostering a more reflective and analytical approach to using technology in mathematics.

The integration of the Symbolab calculator into mathematics instruction is beneficial in improving students' computational and conceptual skills. Makhdum et al. (2023) demonstrated that using Symbolab to teach simultaneous equations significantly enhanced the conceptual understanding of elementary students. Similarly, Paulin and Jean Baptiste (2023) found that the application improved the ability of second-year science and mathematics students to solve trigonometric equations. These findings suggest that the use of Symbolab can have a positive impact on students' mathematical performance when applied in instructional contexts.

However, despite its potential benefits, concerns have been raised regarding errors that the application may produce, which can lead to misconceptions if students rely solely on the tool without guidance. Makhdum et al. (2023) emphasized that while Symbolab supports learning, teacher supervision is essential to ensure the accuracy of student understanding. This finding is consistent with Brookhart's (2013) argument that educational technologies should complement traditional instruction rather than replace it. Teachers must provide scaffolding and critical oversight when students use such tools to mitigate risks of misunderstanding and to guide students in interpreting the solutions correctly.

Incorporating Symbolab into the classroom also aligns with the development of 21st-century skills, particularly digital literacy and independent learning. As Vygotsky (1978) theorized, learning is mediated through tools and social interaction. The use of technological tools like Symbolab, when supported by teacher facilitation, can serve as a cognitive instrument to enhance student learning. Moreover, Sweller (1988) suggested that such tools can reduce cognitive load during problem-solving, provided that students are guided in their use.

From an institutional standpoint, encouraging teachers to innovate and integrate technology into the learning process is both timely and necessary. Qurohman (2024) demonstrated that artificial intelligence-based learning platforms significantly enhanced students' problem-solving skills in algebra, supporting the argument for integrating modern technology in education. Additionally, the Central Board of Secondary Education (2021) advocates for innovative assessment and instructional strategies, emphasizing the importance of aligning teaching methods with contemporary technological advancements.

In all, the use of Symbolab is advisable as it enhances student engagement and mathematical proficiency. Nevertheless, its effectiveness is maximized when students use it under the guidance of teachers to avoid errors and misconceptions. Schools are encouraged to support and train teachers in the effective use of such technologies to enrich the teaching and learning process.

4.0 Conclusion

The findings of this study indicate that Symbolab-assisted instruction has a significant impact on enhancing students' numeracy skills. The integration of this AI-powered tool in teaching integer operations resulted in a notable improvement in students' mathematical performance, as evidenced by statistically significant gains in posttest scores and the transition of many students from failing to passing. Symbolab's structured approach, which includes step-by-step solutions and immediate feedback, helps students overcome difficulties with integer computations and reinforces their foundational skills, which are essential for more advanced mathematical learning.

The study further emphasizes that AI-powered tools can reduce cognitive load and deepen conceptual understanding by providing interactive and personalized learning experiences. This reinforces the relevance of Cognitive Load Theory and Constructivist Learning Theory in technology-enhanced instruction. The evidence highlights the transformative role of technology-driven instruction in bridging numeracy gaps, promoting engagement, and enabling differentiated learning paths that cater to individual student needs. As such, Symbolab and similar platforms represent a paradigm shift in mathematics education, encouraging a broader integration of digital tools to improve learning outcomes.

Based on these findings, several key recommendations are proposed. Mathematics educators are encouraged to incorporate AI-powered tools, such as Symbolab, into their instructional strategies to foster engagement and reinforce conceptual mastery. School administrators should support this by investing in professional development that equips teachers with the skills needed to integrate technology effectively. Educational policymakers are encouraged to incorporate AI-assisted platforms into the curriculum to address persistent learning gaps. Future researchers should investigate the long-term effects of such tools across diverse contexts and mathematical domains. Meanwhile, future instructional interventions could benefit from structured daily drills, adaptive strategies, and extended implementation periods. Additionally, analyzing the effectiveness of specific activities—such as those used in Drill 3—could offer further insights for optimizing learning outcomes.

5.0 Contributions of Authors

Author 1: Conceptualized the research structure and set objectives; authored the introduction, methodology, results, and discussion; developed the research framework; conducted the literature review; prepared instruments; coordinated with participants; led data collection and entry; performed statistical analysis; and finalized the paper.
Author 2: Conceptualized the research topic and objectives; co-authored the introduction, methodology, results, and discussion; developed the research framework; conducted the literature review; prepared the research instruments; and finalized the paper.
Author 3: Formatted, edited, and grammar-checked; references compiled in APA 7th edition; and finalized the paper.

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7.0 Conflict of Interests

The authors reported no potential conflict of interest.

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