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Teaching division using lattice method: Effects on the mathematical performance of Grade VI pupils

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ABSTRACT

Mastery of division is a critical benchmark in elementary mathematics, yet many learners continue to struggle with its abstract procedures and multi-step processes. This study evaluated the effectiveness of Lattice Method in improving the mathematical performance in division of Grade VI pupils of Dulangan Elementary School during the School Year 2025-2026. Specifically, it aimed to determine the pupil's level of mathematical performance in division before and after the intervention, assess whether a significant difference existed between the performance before and after, and measure the intervention's effect size. The study employed a quasi-experimental, single-group pretest-posttest design involving 34 Grade VI pupils. A 30-item researcher-made test focusing on division problems was administered before and after a six-week intervention of the lattice method. Data were analyzed using the mean, standard deviation, paired samples t-test at a 0.05 significance level, and Cohen's d to determine the effect size. Results showed that the pupils' level of mathematical performance in division before the intervention was "Proficient" and improved to "Highly Proficient" after the intervention. There was a significant difference in the performance before and after, favoring the performance after the intervention. Moreover, Cohen's d indicated a very large effect size, suggesting that the lattice method had a substantial positive impact on the level of mathematical performance in division of the Grade VI pupils. These findings highlight the effectiveness of the Lattice Method as a viable alternative to traditional approaches in teaching division.

Keywords: Lattice method, division, mathematical performance, quasi-experimental, single group pretest-posttest.

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INTRODUCTION

Mathematics education plays a crucial role in developing learners' critical thinking, problem-solving abilities, and logical reasoning skills. Globally, mastery of fundamental operations remains a cornerstone of numeracy development, as these skills serve as the foundation for more advanced mathematical concepts. Among these operations, division is considered one of the most essential yet complex skills that learners must acquire, as it supports the development of proportional reasoning and mathematical fluency. It also facilitates the

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transition from basic arithmetic to higher-level mathematical thinking such as fractions, ratios, and algebra (Hulbert et al., 2023). However, despite its importance, research consistently shows that division remains a persistent area of difficulty for elementary learners, often due to gaps in conceptual understanding, procedural fluency, and number sense (Ching & Kong, 2022).

Studies reveal that learners often struggle with both conceptual understanding and procedural fluency in division. Difficulties arise from the need to simultaneously understand equal sharing, grouping, and the inverse relationship between multiplication and division (Kim & Pang, 2017). Learners frequently rely on memorized procedures without fully grasping the underlying concepts, which often leads to misconceptions and errors (Azizah et al., 2026). These findings indicate that division is not merely a computational skill but a cognitively demanding process that requires meaningful understanding and flexible thinking.

In the Philippines, this problem becomes more pronounced as reflected in the consistently low performance of learners in mathematics in both national and international assessments (Inti et al., 2026). Studies have identified gaps in foundational skills, particularly in operations such as division, which significantly affect learners' overall mathematical performance. For instance, Grade VI pupils were found to have only a "beginning" level of numeracy skills, which directly impacts their ability to perform mathematical tasks effectively (Francisco et al., 2025). Moreover, factors such as ineffective teaching strategies, limited instructional materials, and low student engagement further contribute to poor learning outcomes (Isnadi, 2025). These challenges emphasize the urgent need for innovative and effective instructional approaches that can address learners' difficulties in mathematics.

In response to these challenges, recent literature emphasizes the effectiveness of visual and structured instructional approaches in improving mathematical understanding. Visualization techniques, such as diagrams, models, and structured representations, have been shown to enhance learners' comprehension and problem-solving abilities (Panganiban & Quisido, 2021). Similarly, structured methods help reduce cognitive load by breaking down complex tasks into manageable steps, allowing learners to process information more effectively (Purigay, 2025).

One instructional strategy that embodies these principles is the lattice method. Traditionally used in multiplication, the lattice method utilizes a grid-based structure that organizes numerical operations into clear and systematic steps. Studies have demonstrated that this method improves learners' accuracy, engagement, and conceptual understanding by providing visual scaffolding and reducing computational errors (Moreno & Susada, 2024; Rebekawati, 2017). Despite its proven effectiveness, a significant research gap exists in the application of the lattice method in teaching division. Most existing studies focus on its use in multiplication, with limited empirical evidence examining its impact on division, particularly among Grade VI pupils. Additionally, there is a lack of localized research that investigates its effectiveness within the local educational context. Hence, this gap indicates that while the method shows strong potential, its applicability in the teaching division remains underexplored.

As a mathematics teacher of Grade VI pupils at Dulangan Elementary School, the researcher is cognizant of these challenges in everyday classroom experiences. As observed, many pupils demonstrate difficulty in understanding division concepts, frequently commit procedural errors, and struggle to solve word problems. The researcher is genuinely interested in helping them improve their mathematical performance, particularly in division, and is motivated to explore effective instructional strategies that make learning more accessible, engaging, and meaningful.

This study is in line with the MANAGE Research Agenda of the Master of Arts in Education Major in Educational Management Program, specifically for the "M" (Management for Equity and Inclusion), focusing on implementing differentiated instructional strategies to support diverse learners in mathematics. In addition, it is also aligned with the UNESCO

Sustainable Development Goal, specifically SDG 4: Quality Education, aiming to ensure inclusive, equitable, and quality education for all learners.

Given the persistent challenges in learners' mathematical performance, particularly in mastering fundamental computational skills such as division, the researcher aimed to determine the effect of the lattice method in teaching division on the mathematical performance of Grade VI pupils. Specifically, the study sought to examine whether the use of the lattice method could enhance learners' understanding, accuracy, problem-solving skills, and overall performance in division. Through this investigation, the researcher intended to contribute to the improvement of instructional practices in Mathematics by identifying innovative, learner-centered, and effective teaching strategies that could strengthen numeracy skills, increase learner engagement and confidence, and ultimately promote better academic outcomes among elementary pupils.

Statement of the problem

This study aimed to determine the effectiveness of the Lattice Method in improving the mathematical performance in division of Grade VI pupils of Dulangan Elementary School during the School Year 2025-2026.

Specifically, this study aimed to:

1. Determine the level of mathematical performance in the division of Grade VI pupils before and after the intervention of the Lattice Method.
2. Determine if there is a significant difference in the mathematical performance in division of Grade VI pupils before and after the intervention of the Lattice Method.
3. Determine the effect size of the Lattice Method on the mathematical performance in division of Grade VI pupils.

METHODOLOGY

This chapter provides a detailed description of the research design and methodology used to achieve the research objectives. It presents the research design adopted in the study, the locale where the investigation was conducted, the participants involved, and the research instrument utilized to gather the necessary data. The chapter also explains the procedures undertaken to ensure the validity and reliability of the instrument in preparation for the conduct of the study.

This study employed a quasi-experimental, one group pretest–posttest research design to evaluate the effectiveness of the lattice method as an instructional strategy for teaching division among Grade VI pupils. This research design was considered appropriate because it enabled the researcher to examine the effects of the intervention on learners' mathematical performance without the random assignment of participants, a procedure that is often impractical in actual classroom settings. As explained by Schweizer et al. (2016), quasi experimental studies investigate the relationship between an intervention and an outcome even when randomization is not feasible. The study involved only one group, which served as the experimental group. The participants were exposed to the lattice method as an alternative strategy for solving division problems, and the study sought to determine the learners' level of mathematical performance in division before and after the implementation of the intervention.

To establish the participants' baseline level of mathematical performance, a pretest was administered before the implementation of the intervention. The pretest measured the learners' conceptual understanding and procedural fluency in division, thereby providing an initial

assessment of their mathematical performance. Following the administration of the pretest, the intervention was conducted over a six-week period, during which the participants were taught how to solve division problems using the lattice method. Instruction was delivered through 45-minute sessions conducted in both the morning and afternoon classes to provide adequate exposure, guided instruction, and sufficient opportunities for practice. Upon completion of the intervention, the researcher administered a posttest using a test that measured the same competencies assessed during the pretest. This procedure enabled a direct comparison of the pupils' mathematical performance before and after the implementation of the lattice method in teaching division.

The results of the pretest and posttest were subsequently analyzed and compared to determine whether a significant improvement occurred in the learners' mathematical performance in division following the intervention. Through this comparison, the researcher evaluated the effectiveness of the lattice method as a teaching strategy. The research design also provided meaningful insights into how the use of a structured and visual instructional approach such as the lattice method could enhance learners' understanding and performance in solving division problems. Furthermore, the findings served as a basis for determining the potential of the lattice method as an alternative instructional strategy in elementary mathematics education.

The study was conducted at Dulangan Elementary School, Division of Capiz, during the School Year 2025 to 2026. The selection of this locale provided the researcher with access to the target participants and an appropriate setting for implementing the instructional intervention under actual classroom conditions.

The participants of the study consisted of 34 Grade VI pupils from Dulangan Elementary School during the School Year 2025 to 2026. These participants comprised the experimental group and were enrolled in Grade VI Section A. Of the 34 participants, 19 were males and 15 were females. All participants received the same instructional intervention using the lattice method and completed both the pretest and posttest administered during the study.

The primary research instrument used to gather the necessary data was a researcher made test questionnaire administered during both the pretest and posttest phases of the study. The instrument consisted of 30 items focusing on division problems in Mathematics and was aligned with the Grade VI Mathematics learning competencies prescribed by the Department of Education. In answering the test questionnaire, the pupils were instructed to solve the given division problems and present their complete solutions using the lattice method. The instrument was specifically designed to determine the level of mathematical performance of Grade VI pupils in performing the mathematical operation of division.

Prior to data collection, the research instrument underwent face and content validation by a panel of experts to ensure its validity, clarity, and appropriateness for the objectives of the study. Revisions were incorporated based on the recommendations provided by the panel to improve the overall quality of the instrument. After the validation process, the instrument was pilot tested with thirty (30) students. The data obtained from the pilot testing were analyzed using the Statistical Package for the Social Sciences (SPSS) to establish the reliability of the instrument.

For the quantitative phase of the study, internal consistency reliability was assessed using Cronbach's alpha, with 0.70 established as the acceptable threshold in accordance with Nunnally and Bernstein (1994). The analysis produced a Cronbach's alpha coefficient of 0.925, indicating excellent reliability and confirming that the research instrument was suitable for quantitative analysis.

The results of the test on the mathematical performance in division of the participants were interpreted according to the established performance levels. Scores ranging from 26 to 30, equivalent to 90% to 100%, were interpreted as Highly Proficient. Scores ranging from 11

to 25, equivalent to 75% to 89%, were interpreted as Proficient. Scores ranging from 0 to 10, equivalent to 0% to 74%, were interpreted as Below Proficient. These interpretive criteria served as the basis for determining the participants' level of mathematical performance in division during both the pretest and posttest phases of the study.

The data collection procedure for this study commenced with the preparation of a formal letter of request addressed to the Schools Division Superintendent of the Division of Capiz and the Dean of the College of Education to seek approval for the conduct of the research. Upon the approval of the request, the letter was presented to the principal of Dulangan Elementary School to obtain permission for the actual implementation of the study within the school. Securing these approvals ensured that the research was conducted in accordance with institutional and educational policies governing research involving learners.

Before the commencement of data gathering, ethical considerations were given utmost importance and were thoroughly communicated to both the participants and their parents or guardians. Informed consent was obtained from the parents or guardians and assent was likewise secured from the participating pupils to ensure that all participants fully understood the purpose of the study, the procedures involved, and the possible risks and benefits associated with their participation. This process guaranteed that participation in the study was voluntary and conducted in accordance with established ethical standards.

To obtain parental or guardian consent, formal letters explaining the objectives of the study, the nature of pupil participation, and the assurance of confidentiality and voluntary involvement were distributed. The parents or guardians were requested to read the information carefully and sign the consent form as an indication of their approval for their child's participation in the study.

Meanwhile, assent was sought from the Grade VI pupils through a simplified classroom orientation conducted by the researcher. During the orientation, the study was explained using age-appropriate language to ensure that the pupils clearly understood its purpose and procedures. The researcher emphasized that participation in the study was entirely voluntary and that the participants could withdraw from the research at any time without any form of penalty or consequence. Following the orientation, the pupils were requested to sign an assent form to formally indicate their willingness to participate in the study. This two-tiered process ensured that both parental consent and pupil assent were properly obtained and documented, thereby upholding all ethical standards throughout the research process.

The collection of data was carried out in a structured and systematic manner. Initially, the researcher constructed a 30-item test questionnaire focusing on division problems in Mathematics. After the completion of the instrument, it was submitted to a panel of experts for face and content validation to ensure that the content of the instrument was consistent with the research objectives of the study. Following the validation process, the researcher conducted reliability testing on the developed instrument to determine its reliability in gathering the required data. The validated and research tested questionnaire subsequently served as the primary instrument for both the pretest and posttest phases of the study.

Following the preparation and validation of the research instrument, the researcher administered the pretest to the participants, who consisted of the 34 Grade VI pupils enrolled in Section A of Dulangan Elementary School. The administration of the pretest took place in the researcher's classroom during a designated schedule to avoid disrupting regular class activities. The pretest served as the baseline measure of the participants' mathematical performance in division prior to the implementation of the instructional intervention. Consistent with the quasi experimental, one group pretest–posttest research design employed

in the study, the pretest provided the initial data necessary for determining the effectiveness of the lattice method as an instructional strategy for teaching division among Grade VI pupils.

Immediately after the administration of the pretest, the participants underwent the intervention program utilizing the lattice method in learning division to enhance their mathematical performance. The intervention was implemented over a period of six weeks, with instructional sessions lasting 45 minutes during both the morning and afternoon classes. Throughout the intervention period, the researcher provided consistent and targeted instructional support designed to strengthen the participants' mathematical proficiency in division. Various guided exercises, demonstrations, and practice activities were likewise conducted to reinforce the learners' understanding and application of the lattice method in solving division problems. These instructional activities ensured that the participants received sufficient opportunities to develop their conceptual understanding and procedural skills while using the lattice method.

Upon the completion of the six-week intervention, the researcher administered the posttest to the Grade VI pupils using the same research validated instrument to determine whether there was an improvement in their mathematical performance in division after exposure to the lattice method. The results obtained from the posttest were subsequently compared with the pretest scores to evaluate the effectiveness of the lattice method as an instructional strategy for teaching division. This comparison provided the empirical basis for determining the extent to which the intervention contributed to improvements in the mathematical performance of the participating Grade VI pupils.

After the administration of the pretest and posttest, the completed test papers were collected, checked, tallied, and securely stored in preparation for data analysis. The gathered data were analyzed using the Statistical Package for the Social Sciences (SPSS). An alpha level of 0.05 was established for all inferential statistical tests conducted in the study to determine statistical significance.

The statistical tools used to analyze and interpret the gathered data included the mean, standard deviation, paired samples t test, and Cohen's d. These statistical measures were employed to assess the participants' baseline and post intervention mathematical performance in division, determine the significance of the differences between the pretest and posttest scores, and quantify the magnitude of the effect of the instructional strategy implemented in the study.

The mean was used to describe the participants' scores in both the pretest and posttest. This statistical measure provided the average level of mathematical performance of the Grade VI pupils before and after the implementation of the lattice method as an instructional strategy.

The standard deviation was used to determine the homogeneity and heterogeneity of the obtained responses in the pretest and posttest. This measure described the extent to which the participants' scores varied from the mean, thereby providing information regarding the consistency and dispersion of the obtained results.

The paired samples t test, using an alpha level of .05, was employed to determine whether there was a statistically significant difference in the level of mathematical performance in division of the Grade VI pupils between the pretest and posttest. This inferential statistical test determined whether the observed changes in the participants' mathematical performance following the implementation of the lattice method were statistically significant.

Cohen's d was used to determine the effect size of the lattice method on the mathematical performance of the Grade VI pupils. The computed effect size was interpreted using the established criteria. A Cohen's d value of 0.20 was interpreted as Small, indicating a Small but meaningful effect. A Cohen's d value of 0.50 was interpreted as Moderate, indicating a Moderate effect. A Cohen's d value of 0.80 was interpreted as Large, indicating a Strong

effect. These interpretive criteria served as the basis for determining the magnitude of the effect of the lattice method on the mathematical performance of the participants in division.

RESULTS AND DISCUSSION

This chapter presents, analyzes, and interprets the data gathered to address the objectives of the study. The discussion is based on the responses and test results obtained from the 34 Grade VI pupils of Dulangan Elementary School, Division of Capiz, during the School Year 2025 to 2026, who served as the participants of this quasi experimental, one group pretest–posttest study. The participants were selected as the experimental group and were assessed using a researcher made 30 item test questionnaire aligned with the Grade VI Mathematics learning competencies prescribed by the Department of Education. The instrument was administered before and after the six-week intervention utilizing the lattice method to determine changes in the learners' mathematical performance in division. The gathered data were analyzed using the mean, standard deviation, paired samples t test, and Cohen's d with an alpha level of 0.05. The findings presented in this chapter are interpreted in direct relation to the objectives of the study and provide empirical evidence regarding the effectiveness of the lattice method as an instructional strategy for improving the mathematical performance of Grade VI pupils in division.

The first objective of the study was to determine the level of mathematical performance in division of Grade VI pupils before and after the implementation of the lattice method. The findings revealed that before the intervention, the participants obtained a mean score of 15.17 with a standard deviation of 9.45, which was interpreted as Proficient. Based on the established scale of means, scores ranging from 10.01 to 25.00 are interpreted as Proficient, indicating that prior to the intervention, the learners already possessed an acceptable level of understanding and competence in performing division. Although the pupils demonstrated the ability to solve basic division problems, this level of performance also suggests that their mastery of the concept was still developing. The learners had acquired foundational knowledge and procedural skills in division; however, opportunities remained for improving computational accuracy, efficiency, procedural fluency, and conceptual understanding, particularly when solving more complex division problems.

The initial performance level indicates that the participants entered the intervention with sufficient prior knowledge to engage meaningfully in the instructional activities. Nevertheless, being categorized as Proficient also implies that some learners may have continued to experience difficulties with more advanced computational procedures involving multiple steps, accurate place value manipulation, regrouping, and procedural precision. These challenges are commonly encountered among elementary learners as division requires simultaneous application of several mathematical concepts and procedures. Consequently, although the learners demonstrated satisfactory performance before the intervention, additional instructional support remained necessary to strengthen their understanding and mastery of division concepts.

Following the six-week implementation of the lattice method, the mathematical performance of the participants improved substantially. The posttest results revealed a mean score of 28.13 with a standard deviation of 8.68, which was interpreted as Highly Proficient. According to the established scale of means, scores ranging from 25.01 to 30.00 are classified as Highly Proficient. This result indicates that after exposure to the lattice method, the Grade VI pupils demonstrated a markedly higher level of competence in solving division problems. The considerable increase in the mean score suggests that the learners performed division tasks

with greater computational accuracy, improved procedural fluency, and stronger conceptual understanding than they had demonstrated prior to the intervention.

The progression from a Proficient level during the pretest to a Highly Proficient level during the posttest reflects a substantial enhancement in the learners' mastery of division concepts following the instructional intervention. Although descriptive statistics alone do not establish causality, the observed improvement suggests that the lattice method may have facilitated learners' ability to organize numerical information systematically and execute division procedures more efficiently. The structured grid format characteristic of the lattice method appears to have supported learners in visualizing the sequence of computational steps, thereby improving both accuracy and confidence in solving division problems.

The findings further indicate that the structured nature of the lattice method may have helped reduce computational errors commonly associated with place value, regrouping, and multi-step procedures. By presenting numerical information in an organized visual framework, the method likely enabled learners to focus on individual computational processes while maintaining awareness of the overall solution sequence. Such a structured approach may have reduced confusion during computation and provided learners with a clearer understanding of the relationships among the numbers involved in division operations. Consequently, the pupils demonstrated stronger computational skills and more accurate application of division procedures following the intervention.

Although the posttest results demonstrated a substantial improvement in mathematical performance, the standard deviations obtained during both assessments indicate that variability among learners' scores remained evident. The pretest standard deviation of 9.45 and the posttest standard deviation of 8.68 suggest that while many participants experienced considerable improvement following the intervention, differences in individual performance continued to exist. This variability implies that although the lattice method benefited the majority of learners, some pupils may still require additional instructional support and extended practice to achieve complete mastery of division concepts.

The present findings are consistent with the study of Ching and Kong (2022), who emphasized that division is a cognitively demanding mathematical operation requiring learners to understand grouping, sharing, and the inverse relationship between multiplication and division. These cognitive demands may explain why the participants initially demonstrated only a Proficient level of performance despite having previous exposure to division concepts. The complexity inherent in division underscores the importance of providing learners with instructional approaches that simplify computational procedures while strengthening conceptual understanding.

The findings likewise corroborate the study of Moreno and Susada (2024), who reported that learners taught using the lattice method achieved higher mathematical performance than those instructed through traditional teaching approaches. According to these authors, the visual and systematic characteristics of the lattice method enable learners to organize computations more effectively, thereby improving procedural accuracy and minimizing computational errors. The substantial increase from a mean score of 15.17 to 28.13 observed in the present study supports this assertion and suggests that structured computational frameworks can significantly enhance learners' mathematical achievement.

Similarly, the results align with the findings of Aspuria (2025), who reported that learners exposed to the lattice method demonstrated significant improvements in mathematical proficiency, progressing from lower levels of performance to higher categories of mastery. The author concluded that structured instructional support enables learners to develop stronger computational skills while facilitating meaningful conceptual growth. The present findings reinforce this conclusion by demonstrating that the participants progressed from a Proficient level to a Highly Proficient level following the intervention. This progression suggests that the

lattice method not only contributes to improved test performance but also supports meaningful learning by providing learners with organized procedures that reduce confusion and strengthen conceptual understanding.

The observed improvement may also be explained through the role of visual representations in mathematics instruction. Panganiban and Quisido (2021) emphasized that visual instructional approaches transform abstract mathematical concepts into more concrete and understandable representations, making them particularly beneficial for elementary learners who are still developing foundational mathematical competencies. Within the context of the present study, the grid-based structure of the lattice method functioned as a visual scaffold that enabled pupils to decompose complex division problems into smaller and more manageable computational components. Such visual organization likely reduced cognitive load, minimized computational errors, and enhanced both efficiency and accuracy during problem solving.

Furthermore, the findings support the view that learner centered and structured instructional strategies contribute significantly to improved mathematical achievement. Calegu and Castañaga (2021) argued that engaging and interactive instructional approaches enhance learners' conceptual understanding and problem-solving abilities. Consistent with this perspective, the lattice method actively engaged learners in a systematic learning process that required them to perform computations sequentially while maintaining a clear understanding of each procedural step. This instructional approach may have contributed to the notable improvement observed in the participants' mathematical performance.

The results are likewise supported by Espiritu and Vendicacion (2024), who reported that sequential and step by step instructional approaches significantly improve learners' performance in division. Similar to the instructional approach employed in the present study, the lattice method provides learners with a clearly defined computational sequence that guides them through each stage of the division process. This systematic procedure reinforces both conceptual understanding and procedural accuracy while reducing opportunities for computational mistakes.

Overall, the findings indicate that the mathematical performance of the Grade VI pupils in division improved considerably following exposure to the lattice method. The increase from a mean score of 15.17 with a standard deviation of 9.45, interpreted as Proficient, to a mean score of 28.13 with a standard deviation of 8.68, interpreted as Highly Proficient, demonstrates that the participants achieved higher levels of computational accuracy and conceptual understanding after the intervention. These findings suggest that structured, visual, and learner centered instructional strategies such as the lattice method have substantial potential to enhance mathematical learning, particularly in complex computational operations such as division.

CONCLUSION

The primary purpose of this study was to determine the effect of the lattice method on the mathematical performance in division of Grade VI pupils at Dulangan Elementary School during the School Year 2025 to 2026. Specifically, the study sought to determine the level of mathematical performance in division before and after the intervention, establish whether a significant difference existed in learners' mathematical performance before and after the implementation of the lattice method, and determine the effect size of the lattice method on learners' performance in division. To accomplish these objectives, the study employed a quasi-experimental research design using a single group pretest-posttest approach involving 34 Grade VI pupils composed of 19 males and 15 females from Section A of Dulangan Elementary

School. Mathematical performance was measured using a validated 30 item researcher made test that underwent expert validation and pilot testing to ensure reliability. The gathered data were analyzed using the mean, standard deviation, paired samples t-test at a 0.05 level of significance, and Cohen's d to determine the magnitude of the intervention's effect.

The findings of the study demonstrated that the mathematical performance in division of the Grade VI pupils improved substantially following the implementation of the lattice method. Prior to the intervention, the learners achieved a performance level interpreted as Proficient, indicating that they possessed acceptable foundational knowledge and competence in division but still required additional instructional support to strengthen procedural accuracy and conceptual understanding. Following the six-week intervention, the learners attained a performance level interpreted as Highly Proficient, signifying a marked improvement in their mathematical achievement. This progression suggests that the lattice method effectively enhanced learners' understanding of division through its structured, visual, and systematic approach. By organizing numerical information within a grid-based framework, the method enabled pupils to break down complex computational procedures into smaller and more manageable steps, thereby improving computational accuracy, reinforcing conceptual understanding of place value, reducing common computational errors, and strengthening both procedural fluency and conceptual development in mathematics.

The results further revealed a statistically significant difference between the mathematical performance of the Grade VI pupils before and after the implementation of the lattice method, with the posttest results demonstrating superior performance. This finding confirms that the observed improvement was not attributable to chance but reflected a meaningful change in learners' mathematical achievement following exposure to the intervention. The improvement suggests that the lattice method effectively addressed learners' difficulties in division while strengthening their foundational mathematical competencies. The findings likewise emphasize the importance of adopting structured, innovative, and learner centered instructional strategies that provide pupils with clearer pathways for understanding abstract mathematical concepts. Consequently, the study supports the conclusion that the lattice method is a valid and effective alternative to traditional instructional approaches, particularly conventional long division procedures, in improving learners' mathematical performance.

Moreover, the findings demonstrated that the lattice method produced a very large to extremely large effect size on the mathematical performance in division of the Grade VI pupils. The magnitude of the effect indicates that the improvement achieved by the learners was not only statistically significant but also educationally meaningful and substantial in actual classroom practice. Rather than producing only incremental gains, the intervention generated transformative improvements in learners' mathematical abilities. The structured and visually organized nature of the lattice method appears to accommodate diverse learning needs by providing a systematic framework that supports learners who experience difficulties with conventional algorithms. Its step-by-step procedure promotes greater comprehension, minimizes cognitive load, reduces computational errors, enhances learner confidence, and improves overall mathematical performance. Taken collectively, these findings affirm that the lattice method is a powerful, inclusive, and pedagogically effective instructional strategy for enhancing learners' mathematical performance in division.

In light of these findings, the study underscores the importance of encouraging learners to actively engage with structured and alternative instructional strategies such as the lattice method when solving division problems. Regular practice using this visual and systematic approach may strengthen conceptual understanding, improve procedural fluency, develop greater flexibility in mathematical problem solving, enhance computational accuracy, reduce common computational errors, and build learner confidence. At the same time, teachers are encouraged to integrate the lattice method into mathematics instruction, particularly in teaching

division, alongside traditional instructional approaches to provide richer and more meaningful learning experiences. The adoption of visual, structured, and learner centered teaching strategies, coupled with guided practice, instructional scaffolding, immediate feedback, and continuous professional development on innovative pedagogical approaches, may further strengthen classroom instruction and improve learners' mathematical achievement.

The findings likewise highlight the important role of school administrators in supporting the implementation of innovative instructional strategies by providing teachers with adequate instructional resources, learning materials, seminars, workshops, and in service training programs focused on effective mathematics instruction. Fostering a culture that values instructional innovation and evidence-based teaching practices, together with regular monitoring and evaluation of classroom strategies, may contribute to sustained improvements in learners' academic performance. Similarly, parents play a significant role in reinforcing classroom learning by familiarizing themselves with instructional strategies such as the lattice method and assisting their children in practicing division at home. Their continued encouragement, emotional support, and efforts to cultivate positive attitudes toward mathematics may strengthen learners' confidence while reducing mathematics anxiety and promoting consistent academic growth.

The results of the study also suggest important implications for educational policy and future scholarly inquiry. The Department of Education may consider promoting the lattice method as a supplementary instructional strategy for teaching division and other related mathematical operations by incorporating it into teacher training programs, instructional guides, and learning resource materials. Strengthening policies that encourage innovative, visual, and learner centered instructional approaches may contribute to improved numeracy skills and better learning outcomes among elementary learners. Furthermore, future researchers are encouraged to investigate the effectiveness of the lattice method across other areas of mathematics, including multiplication, fractions, algebraic expressions, and mathematical problem solving, while also conducting comparative studies involving other instructional approaches. Additional investigations involving different grade levels, learning environments, learner profiles, and learners with learning difficulties, as well as longitudinal studies examining long term retention and sustained mathematical performance, would provide further evidence regarding the broader applicability of the method. Future studies may likewise explore the integration of the lattice method with digital technologies, interactive applications, gamified learning platforms, and blended learning environments to determine how traditional visual strategies may be effectively adapted to twenty first century educational contexts. Moreover, examining teachers' perceptions, implementation experiences, readiness, challenges, and professional development needs may provide valuable insights for strengthening the long-term implementation and sustainability of the lattice method in mathematics instruction.

Overall, the findings of the study provide compelling evidence that the lattice method is an effective instructional strategy for improving the mathematical performance in division of Grade VI pupils. The substantial improvement from a Proficient level before the intervention to a Highly Proficient level after its implementation, the statistically significant difference between pretest and posttest performance, and the very large to extremely large effect size collectively demonstrate that the lattice method contributes meaningfully to learners' computational accuracy, procedural fluency, conceptual understanding, and confidence in mathematics. These findings reinforce the value of structured, visual, and learner centered instructional approaches in elementary mathematics education while providing practical guidance for learners, teachers, school administrators, parents, educational policymakers, and

future researchers seeking to improve mathematics teaching and learning through evidence based instructional innovation.

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