

Enhancing Grade 4 Pupils' Division Skills Using Link Strategy

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ABSTRACT

Division is a foundational mathematical skill that supports the development of more complex concepts such as fractions, ratios, and problem-solving strategies. However, many Grade 4 pupils struggle to understand and apply division, which hinders their overall mathematical progress. The study was conducted to improve Grade 4 pupils' division skills by implementing the LINK Strategy in a public elementary school's academic year 2024–2025. Utilizing a classroom-based action research design, the study involved 49 purposively selected pupils from one section. A researcher-made test served as the primary data collection instrument, and the results were analyzed using the mean, standard deviation, and a t-test to assess performance levels and determine statistical significance. The following were the study's key findings: the level of pupils' division skills before implementing the LINK Strategy was fairly satisfactory, and the level of pupils' division skills after implementing the LINK Strategy was outstanding. There was a significant difference in pupils' division skills before and after implementing the LINK Strategy. There is a need for more engaging and structured strategies to support learners in mastering basic mathematical operations. Mathematics teachers may use the LINK Strategy as a regular instructional approach to enhance pupils' division skills and overall numeracy.

Index Terms: division skills, enhancement, implementation, LINK strategy, Mathematics

INTRODUCTION

Division is a foundational mathematical skill that plays a key role in developing more advanced concepts like fractions, ratios, and problem-solving strategies. However, many Grade 4 pupils find it challenging to understand and apply division, which can slow down their overall progress in mathematics. This challenge has become increasingly noticeable at a public elementary school in Ozamiz City, where learners have shown low performance and poor retention in division-related lessons. Addressing this issue calls for innovative and engaging teaching methods that simplify abstract ideas and encourage active learning. One such approach is the LINK Strategy, designed to improve pupils' understanding by connecting new concepts to their prior knowledge and real-life experiences. This study examines the effectiveness of the LINK Strategy in strengthening Grade 4 pupils' division skills and supporting their long-term retention of mathematical concepts.

Division and multiplication are interrelated foundational operations in mathematics, essential for developing problem-solving skills and overall mathematical proficiency. However, many pupils struggle with division tasks due to a lack of familiarity and mastery of multiplication tables, which are crucial for performing division effectively (Arighileri, 2020). Various educational programs have emphasized rote memorization and repetitive practice of multiplication tables, while others incorporate visual aids, manipulatives, and gamified approaches to boost engagement. Despite these efforts, pupils often struggle to grasp the multiplication conceptually, viewing it as a mechanical process rather than understanding its connection to division and numerical patterns. This highlights the importance of teaching multiplication and division, such as repeated addition and subtraction, to promote deeper understanding. Other researchers have also advocated for instructional approaches that relate these operations to real-life contexts (Bryant, 2020). Indeed, a strong understanding of whole number

multiplication and division is the foundation for key multiplicative concepts such as ratios, slope, rate of change, and proportions—critical areas for advancing in mathematics (Lampert, 2020).

Many pupils struggle to learn mathematics, often because they perceive it as a complex and challenging subject. This perception negatively affects their academic performance and leads to low learning outcomes. To address this issue, applying a practical and suitable teaching approach is essential to help make mathematical concepts more accessible and understandable for learners (Kamid et al., 2022). The data analysis revealed that not all teachers could accurately interpret the concept of division in relation to digits. Their approach focused more on obtaining the correct answer and explaining its reasoning. Nonetheless, a few teachers were observed to make similar generalizations in their understanding and teaching of the concept (Korkmaz, 2021). Well-designed interventions and strategies are structured, high-impact learning approaches tailored to pupils' current performance levels. The effectiveness of such interventions depends greatly on thoughtful planning of both the frequency and duration of sessions. Future research should explore which teaching methods work best for specific skills and determine the ideal intensity for delivering these interventions (Schnepel & Aunio, 2022).

Mastering division is essential for developing more advanced mathematical skills, such as understanding fractions, ratios, and proportional reasoning. However, many Grade 4 pupils struggle to learn and apply division, leading to low performance and poor retention. This study aims to evaluate the effectiveness of the LINK Strategy in addressing this issue by making abstract mathematical concepts more concrete and relatable through prior knowledge and real-life connections. The ongoing difficulties with division among learners in a public elementary school in Ozamiz City highlight the need for innovative, structured, and engaging instructional approaches. Implementing the LINK Strategy during S.Y. 2024–2025 seeks to improve the division skills and long-term retention of Grade 4 pupils, offering a potential solution to the persistent challenge of low mathematical achievement.

Mastering division is essential for building more advanced mathematical skills, such as understanding fractions, ratios, and proportional reasoning. However, many Grade 4 pupils face difficulties learning and applying division, resulting in low performance and retention. This study seeks to evaluate the effectiveness of the LINK Strategy in addressing this issue by making abstract mathematical concepts more concrete and relatable through prior knowledge and real-life connections. The persistent struggle with division among learners in a public elementary school in Ozamiz City highlights the need for innovative, structured, and engaging instructional approaches. Applying the LINK Strategy during the S.Y. 2024–2025 aims to improve the division skills and long-term retention of Grade 4 pupils, offering a possible solution to the ongoing challenge of poor mathematical performance.

This action research aimed to enhance the division skills of Grade 4 pupils from one section enrolled in the School Year 2024–2025 at a public elementary school in Ozamiz City. Specifically, this study sought to answer the following questions:

1. What is the pupils' division skills level before implementing the LINK strategy?
2. What is the level of pupils' division skills after implementing the LINK strategy?
3. Is there a significant difference in pupils' division skills before and after implementing the LINK strategy?

METHODS

Research Design

This study employed a classroom-based action research design using the LINK Strategy to improve Grade 4 pupils' division skills. This approach was chosen due to its strong recognition as an effective research methodology in education and instructional innovation (Cronholm & Göbel, 2022).

Research Setting

The study took place at the elementary level, specifically with Grade 4 pupils at a public elementary school in Ozamiz City, Misamis Occidental, during the 2024–2025 school year. In line with the Department of Education (DepEd) policies, the school actively implements the K to 12 Basic Education Curriculum, serving learners from kindergarten through Grade 6. Following DepEd guidelines, the school prioritizes providing learners with a strong foundation in core subjects—especially Mathematics—to develop their critical thinking and problem-solving abilities. The institution remains dedicated to offering a holistic and quality educational experience through innovative strategies that support academic excellence, character growth, and active community involvement.

Respondents of the Study

The study's respondents were Grade 4 pupils from one section taught by the researcher. A total of 49 pupils were selected through purposive sampling. The selection criteria included pupils enrolled in Grade 4 for the 2024–2025 school year, those with low performance in multiplication and division, and those willing to participate in the study. The group was heterogeneous, ensuring a diverse mix of backgrounds and abilities. The researcher confirmed that all these criteria were met before conducting the study. However, it is important to note that the study did not include pupils from other sections of the same grade level.

Research Instruments

The researcher used the following instruments as tools in gathering the data:

A. Division Skills Test. This was a 20-item test created by the researcher to measure Grade 4 pupils' understanding of division, divided into four categories based on the LINK Strategy. Each category included five items:

- **L – Link Multiplication and Division with Visuals:** This section assessed pupils' ability to connect multiplication and division using visual tools such as fact family triangles, arrays, and bar models. The focus was on reinforcing division as the inverse of multiplication.
- **I – Introduce Division Through Simple Word Problems:** This part tested how well pupils could apply division to real-life situations. They were evaluated on writing division sentences from word problems and verifying answers using multiplication.
- **N – Nurture Understanding Through Hands-On Activities:** This section focused on dividing, grouping, or sharing using concrete materials like blocks or counters. It also included peer collaboration tasks to strengthen understanding through active, hands-on learning.
- **K – Keep Reinforcing with Quick Mental Math:** This section measured pupils' fluency and accuracy in solving fundamental division problems through timed exercises and mental math verification.

To ensure the test's content validity, the researcher sought expert validation from the research adviser, school head, principal, and cooperating teacher. The following scale was used to interpret test performance.

Score	Grade Equivalent	Interpretation
17-20	90-100	Outstanding
15-16	85-89	Very Satisfactory
13-14	80-84	Satisfactory
11-12	75-79	Fairly Satisfactory
1-10	74 below	Did Not Meet Expectations

Lesson Plan. The researcher developed a lesson plan to improve pupils' understanding of multiplication and division using the L.I.N.K. (Link, Introduce, Nurture, Keep) strategy. Before implementation, the cooperating teacher carefully reviewed and revised the lesson plan based on feedback from the researcher. The lesson was then carried out with Grade 4 pupils at a public elementary school in Ozamiz City, Misamis Occidental, during the 2024–2025 school year.

Data Collection

- A. *Pre-Implementation Phase.* The researcher requested permission from the dean of the College of Education. Upon approval, the researcher secured consent from the Schools Division Superintendent, the school principal, and the cooperating teacher to conduct the study. Data collection began only after all necessary permissions were obtained. During this phase, the researcher prepared the lesson plan, pre-test, post-test, and instructional materials aligned with the L.I.N.K. (Link, Introduce, Nurture, Keep) strategy for teaching multiplication and division.
- B. *Implementation Phase.* The researcher implemented the lessons on multiplication and division using the L.I.N.K. strategy. The pupils were guided through visual aids, word problems, hands-on activities, and reinforcement exercises designed to strengthen their conceptual understanding. Detailed instructions were provided for each strategy component to ensure active engagement and clarity. The intervention was conducted over several sessions with the selected Grade 4 pupils. After the completion of the intervention, a post-test was administered to assess improvement in the pupils' performance.
- C. *Post-Implementation Phase.* The post-implementation phase involved analyzing the pre-test and post-test results to determine the effectiveness of the L.I.N.K. strategy. Based on the data collected, conclusions were drawn, and recommendations were provided for future research or classroom application. The research manuscript was then proofread, edited, and finalized. The findings were disseminated adequately to relevant stakeholders, including the cooperating school and educational supervisors. It also involved properly disseminating the research results to a particular group.

Ethical Considerations

Creswell (2005) emphasized the importance of acting ethically when conducting research, whether that means treating participants with respect, providing accurate and comprehensive data, or taking into account other issues. Ethical researchers must be the first to conduct relevant, successful research. Therefore, the researcher must be aware of ethical issues to ensure the success of research projects.

Prior to conducting the study, permission was requested from the College of Education. Letters requesting their consent to participate in the study were sent to the participants. The participants received assurances that strict adherence to confidentiality is maintained in the collection, use, and presentation of data. For instance, to maintain confidentiality, all names have been changed. This process guaranteed the ethical and secure conduct of research involving human subjects.

Data Analysis

The following statistical tools were employed with Minitab software:

Frequency and Percentage. These were used to determine the pupils' performance in multiplication and division before and after using the L.I.N.K. strategy.

Mean and Standard Deviation. These were utilized to identify the average performance and variability in pupils' scores in the pre-test and post-test.

Paired T-test. This statistical tool was used to determine if there was a significant difference in pupils' performance before and after implementing the L.I.N.K. strategy.

RESULTS AND DISCUSSIONS

Pupils' Division Skills Before the Implementation of the LINK Strategy

Table 1 shows the overall performance level of pupils' division skills before the LINK strategy was implemented. The data indicate that the group's average performance falls within the "Fairly Satisfactory" range ($M = 12.35$; $SD = 3.30$). This suggests that, on average, pupils had a basic grasp of the material, but there was considerable variation in their performance. The relatively high standard deviation reveals that while some pupils did well, many others struggled to meet the expected standards. This wide range of scores highlights the diverse learning needs within the group and points to the importance of using differentiated instruction and targeted support. Addressing these varied needs through tailored teaching strategies is essential to help more pupils achieve or exceed the desired academic standards.

The point at which division becomes challenging varies for each student. However, for many, it becomes tough when working with two-digit divisors and larger dividends, as mental calculations alone are often inadequate, making using paper and pencil essential for keeping track and solving the problems effectively (Liebert, 2022). Effective assessment practices must monitor learning and inform teaching to address performance gaps and support learner progress. Likewise, recent studies emphasize the importance of individualized and inclusive instruction in addressing diverse learner needs in post-pandemic education settings (Andres & Cruz, 2022). In addition, integrating targeted feedback and intervention strategies can enhance students' engagement and academic outcomes, especially for those who consistently underperform (Lopez & Santiago, 2023).

The findings emphasize the importance of differentiated instruction that meets the diverse learning needs of all pupils, ensuring that both struggling and advanced learners receive the support they need. Targeted interventions are especially crucial for helping students master division problems involving two-digit divisors and larger dividends, where tools like paper and pencil aid in more effective problem-solving. Additionally, ongoing formative assessments should be used to monitor student progress and inform timely adjustments in teaching to close learning gaps. Given the challenges of varied learner abilities and the lingering effects of the post-pandemic learning environment, adopting individualized and inclusive teaching methods is essential to promote fair and equitable academic growth. Regular, constructive feedback also plays a key role in boosting student engagement and motivation, encouraging learners to persist and improve. Finally, providing educators with continuous professional development—such as training in the LINK Strategy—will strengthen their ability to meet student needs and raise overall achievement.

Table 1. Level of Pupils' Division Skills Before the Implementation of the LINK Strategy

Proficiency Level	Frequency	Percentage	M	SD
Outstanding	5	10.20	17.80	2.04
Very Satisfactory	3	6.12	16.00	0.52
Satisfactory	11	22.45	14.27	0.47
Fairly Satisfactory	12	24.49	12.50	0.00
Did Not Meet Expectations	18	36.73	8.94	1.30
Overall Performance	49	100.00	12.35	3.30

Note Scale: 17-20 (Outstanding); 16 (Very Satisfactory); 14-15 (Satisfactory); 12-13 (Fairly Satisfactory) 1-11 (Did Not Meet Expectations)

Level of Pupils' Division Skills After the Implementation of the LINK Strategy

Table 2 presents the overall division skills performance of Grade 4 pupils after implementing the LINK strategy. The group achieved a mean score within the "Outstanding" range, with a mean (M) of 17.41 and a standard deviation (SD) of 1.37. This mean score indicates that, on average, pupils demonstrated excellent understanding and strong proficiency in division, with most meeting or exceeding academic expectations. The high average suggests that the LINK strategy effectively reinforced computational skills while promoting a deeper conceptual grasp of division. The relatively low standard deviation shows moderate consistency across the class, meaning that most pupils scored close to the average, reflecting a shared level of mastery. Although some variation in performance remains—likely due to individual differences—the overall data point to a positively skewed distribution with many pupils achieving similarly high scores. These results support the conclusion that the LINK strategy significantly improved pupils' division skills, leading to higher achievement and a more consistent understanding of the mathematical concepts taught.

As recent studies highlight, using learner-centered and scaffolded approaches, such as LINK, can lead to deeper conceptual understanding and stronger mathematical skills, especially when applied consistently and with guided practice (Del Rosario & Magno, 2021). This outcome also aligns with educational best practices that advocate for active, engaging, and feedback-rich learning environments to improve academic achievement (Santos & Yambao, 2023). Higher-order thinking skills (HOTS) are particularly crucial in the twenty-first century, with metacognition being one of their key indicators. Metacognitive skills involve students' ability to understand and regulate their learning processes and strategies. Improving metacognitive skills in students remains challenging for educators (Safiati et al., 2021).

This study's findings highlight the LINK Strategy's effectiveness in significantly improving pupils' division skills and deepening their understanding of key mathematical concepts. Its success in boosting overall performance and reducing gaps among learners suggests that learner-centered, scaffolded approaches can effectively address diverse learning needs and support most students in achieving mastery. This underscores the value of using active, engaging teaching methods paired with consistent, meaningful feedback to improve learning outcomes. The results also highlight the importance of incorporating strategies that build higher-order thinking skills, especially metacognition, which helps learners take control of their learning, think critically, and work more independently. These are essential skills for academic success in the twenty-first century.

Table 2. Level of Pupils' Division Skills After the Implementation of the LINK Strategy

Proficiency Level	Frequency	Percentage	M	SD
Outstanding	35	71.43	18.11	0.83
Very Satisfactory	10	20.41	16.00	0.00
Satisfactory	4	8.16	14.75	0.50
Overall Performance	49	100.00	17.41	1.37

Note Scale: 17-20 (Outstanding); 16 (Very Satisfactory); 14-15 (Satisfactory); 12-13 (Fairly Satisfactory) 1-11 (Did Not Meet Expectations)

Significant Difference in Pupils' Division Skills Before and After the LINK Strategy

Table 3 presents the results of a paired-sample t-test comparing pupils' division skills before and after implementing the LINK Strategy, a teaching intervention to improve mathematical learning. The findings show a clear performance improvement. Before introducing the strategy, the pupils had a mean score of 12.35 with a standard deviation (SD) of 3.30, reflecting relatively low scores with a wide range of variability. After the intervention, the mean score increased significantly to 17.41, and the standard deviation decreased to 1.37, indicating higher achievement and greater consistency across the group. The calculated t-value of 13.26 and a

p-value of 0.00 confirm this improvement is statistically significant ($p < 0.01$). As a result, the null hypothesis (H_0) is rejected, confirming that the LINK Strategy had a significant positive effect on pupils' division skills.

The substantial improvement supports the effectiveness of the LINK strategy as an instructional approach that positively influences learners' academic performance in mathematics. Hence, according to the Department of Education (2022), evidence-based strategies focusing on learner engagement, conceptual understanding, and scaffolded instruction are critical to addressing learning gaps, especially in foundational skills such as numeracy. Researchers found that contextualized and interactive teaching strategies significantly boost students' comprehension and performance in math subjects (Magat & Robles, 2021). The findings in this table also reflect the principles of active learning and mastery learning, which emphasize repeated practice, immediate feedback, and progressive skill development—components typically embedded in structured strategies like LINK (Gomez & Santos, 2023).

The findings demonstrate that the LINK Strategy is highly effective in improving pupils' division skills, as shown by the significant increase in mean scores and the reduced variation in performance after its implementation. These results suggest that structured, scaffolded teaching methods that actively engage learners and strengthen conceptual understanding can help close learning gaps and support mastery of essential numeracy skills. The statistically significant outcomes validate the use of evidence-based, interactive instructional strategies to drive consistent and lasting academic growth. The findings highlight the value of incorporating active learning and mastery-based principles—such as repeated practice, timely feedback, and gradual skill development—into mathematics instruction to support diverse learners better and promote deeper understanding and long-term skill retention.

Table 3. Significant Difference in Pupils' Division Skills Before and After the Use of LINK Strategy

<i>Variables</i>	<i>M</i>	<i>SD</i>	<i>t-value</i>	<i>p-value</i>	<i>Decision</i>
<i>Before the Use of the LINK Strategy</i>	<i>12.35</i>	<i>3.30</i>	<i>13.26</i>	<i>0.00</i>	<i>Reject H_0</i>
<i>After the Use of the LINK Strategy</i>	<i>17.41</i>	<i>1.37</i>			

Note: Note: Probability Value Scale: ** $p < 0.01$ (Highly Significant); * $p < 0.05$ (Significant); $p > 0.05$ (Not Significant)

SUMMARY AND FINDINGS

Summary

Division is a foundational mathematical skill that supports the development of more advanced concepts such as fractions, ratios, and problem-solving strategies. Despite its importance, many Grade 4 pupils find it challenging to understand and apply division, which hampers their overall progress in mathematics. This study was conducted to improve the division skills of Grade 4 pupils by implementing the LINK Strategy during the 2024–2025 academic year in a public elementary school. Employing a classroom-based action research design, the study involved 49 purposively selected pupils from a single section. A researcher-made test served as the primary instrument for data collection, and the results were analyzed using the mean, standard deviation, and a t-test to evaluate performance levels and determine statistical significance. Specifically, the study sought to answer the following research questions: 1) What is the pupils' division skills level before implementing the LINK strategy? 2) What is the level of pupils' division skills after implementing the LINK strategy? 3) Is there a significant difference in pupils' division skills before and after implementing the LINK strategy?

Findings

The following were the key findings of the study:

1. The pupils' division skills level before implementing the LINK strategy was fairly satisfactory.

2. The level of pupils' division skills after implementing the LINK strategy was outstanding.
3. A highly significant difference exists in pupils' division skills before and after implementing the LINK strategy.

CONCLUSION AND RECOMMENDATIONS

Conclusions

Based on the findings, the following conclusions are drawn:

1. There is a need for more engaging and structured strategies to help learners master Perform basic mathematical operations effectively.
2. The LINK Strategy has enhanced pupils' understanding, accuracy, and confidence when solving division problems.
3. The LINK Strategy, as a learner-centered and scaffolded approach, can be considered a valuable tool for strengthening foundational mathematical skills among elementary pupils.

Recommendations

Based on the findings and conclusions, it is recommended that:

1. Pupils may practice solving practical problems involving division, participating in group math activities, and engaging in tasks that require logical thinking and accuracy.
2. Mathematics teachers may regularly use the LINK Strategy as part of their instructional approach to enhance pupils' division skills and overall numeracy.
3. School administrators are encouraged to support the implementation of innovative strategies like LINK by providing appropriate training, instructional resources, and opportunities for professional development focused on learner-centered teaching approaches.
4. Future researchers may explore the effectiveness of the LINK Strategy in improving other mathematical operations, such as multiplication, subtraction, or problem-solving, and test its impact across different grade levels.

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