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Effectiveness of the Digital Home-Based Learning Packet in Enhancing Grade 3 Learners' Division Skills in Mathematics

Angela Arwin E. Nogpo [1] ,Dr. Lilybeth J. Matira [1]
1 – National Teachers College
nogpoangela@gmail.com / 0009-0004-3345-6749

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Abstract

Difficulties in learning division remain a common challenge among Grade 3 learners, particularly in home-based learning settings where guided instruction is limited. This study aimed to develop and evaluate a Digital Home-Based Learning Packet designed to improve learners' division skills. Specifically, it sought to determine: (1) the features of the developed packet in terms of content alignment with the DepEd MATATAG Curriculum, story-based integration and activities, and interactive instructional components; (2) the experts' evaluation of the packet in terms of content quality, instructional quality, technical quality, and other findings; (3) the level of performance of Grade 3 learners in their pretest and posttest results; and (4) whether there was a significant difference between the pretest and posttest result.

A quasi-experimental one-group pretest-posttest design was employed, involving Grade 3 learners and expert evaluators. Data were analyzed using descriptive statistics and the Shapiro-Wilk test. Findings from the study revealed that the developed packet obtained outstanding ratings across all evaluation criteria, with minimal identified errors. Learners' posttest performance improved compared to their pretest results, with a significant difference observed. These imply that the developed material is effective in enhancing division skills of Grade 3 learners. This present study thereby recommends its use in home-based and classroom learning settings.

Keywords: *Digital Home-Based Learning Packet, Division Skills, Grade 3 Mathematics*

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INTRODUCTION

The development of learners' critical thinking and problem-solving abilities is significantly influenced by mathematics. Nevertheless, division continues to be one of the most difficult mathematical operations for elementary students, as it necessitates the ability to employ logical reasoning, estimation, subtraction, and multiplication (Ouaf, 2024). The persistent gaps in mathematical achievement are frequently the result of learners' inability to graduate to more complex mathematical concepts due to their difficulties with division.

The issue is evident in international assessments, where Filipino students consistently exhibited subpar mathematics performance. The Philippines was among the lowest-performing countries in mathematics, as evidenced by the results of the Programme for International Student Assessment (PISA) in 2018 and 2022. This underscores the necessity of innovative and effective instructional interventions. Moreover, the importance of supplying instructional resources that are in accordance with competency-based learning has been underscored by the implementation of the MATATAG Curriculum (Gumla, 2026).

The significance of digital learning materials in modern education has been underscored by the growing prevalence of technology among children. Young learners are capable of employing digital devices to facilitate independent learning, as per Luh et al. (2020). In the same vein, Maphosa et al. (2020) contended that digital learning resources enhance collaboration among instructors, parents, and learners, thereby addressing learning gaps that traditional instructional materials may not be able to adequately resolve. By integrating visual, auditory, and interactive elements that facilitate comprehension and sustain attention, interactive multimedia materials further enhance learner engagement and motivation (Aurelia et al., 2024; Lavidas, 2022).

Successful home-based learning is also significantly influenced by parental involvement. In mathematics, learners who receive active support from their parents exhibit greater confidence and achievement, according to research conducted by Aquino et al. (2019), Peteros et al. (2019), and Leander et al. (2021). This support functions as a form of scaffolding that enables learners to complete duties within their Zone of Proximal Development (ZPD).

The current investigation was founded on Vygotsky's Zone of Proximal Development and Constructivist Learning Theory, which prioritize scaffolded instruction, supervised practice, and active learning (Irshad et al., 2021; Thu et al., 2023). The study devised and evaluated a Digital Home-Based Learning Packet that was intended to improve the division skills of Grade 3 learners through interactive activities, contextualized stories, and structured exercises, guided by these theories.

Specifically, the study sought to: (1) Describe the features of the developed Digital Home-Based Learning Packet: (a) Content alignment with DepEd MATATAG Curriculum, (b) story-based integration and activities, (c) interactive instructional components; (2) Determine experts’ evaluation of the packet in terms of content quality, instructional quality, technical

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quality, and other findings; (3) Assess learners' performance in division through pretest and posttest scores; (4) Determine whether a significant difference exists between learners' pretest and posttest performance.

Review of Related Literature

The development of foundational numeracy skills remains a significant challenge for learners worldwide, particularly in the field of mathematics. The Programme for International Student Assessment (PISA) results from 2018 and 2022 indicate that Filipino learners continue to exhibit subpar performance in mathematics, underscoring the ongoing challenges they face in mastering fundamental mathematical concepts. The limited availability of instructional resources and technology required to facilitate the implementation of the DepEd MATATAG Curriculum further exacerbates this concern (Gumla, 2026). The necessity of innovative and accessible learning interventions that can enhance learners' mathematical competencies is underscored by these challenges.

Division is regarded as one of the most challenging concepts for elementary learners among the fundamental mathematical operations, as it necessitates the incorporation of estimation skills, multiplication, and subtraction. Many primary learners encounter challenges in comprehending division and frequently exhibit sluggish academic advancement when adequate support is unavailable, as per Ouaf (2024). Instructional time is further diminished by learning interruptions resulting from school closures, weather disturbances, and other disruptions, which contribute to learners' inadequate mathematics performance.

The efficacy of digital learning materials in facilitating learners' academic success has been underscored by recent research. Digital resources offer self-paced, engaging, and flexible learning experiences that foster independent learning and foster collaboration among instructors, parents, and learners (Luh et al., 2020; Maphosa et al., 2020). Similarly, interactive multimedia components, including animations, audio, visuals, and immediate feedback, have been demonstrated to enhance learner engagement and comprehension, particularly in the context of mathematics instruction (Akin, 2022; Aurelia et al., 2024; Howerton & Polly, 2023; Lavidas, 2022; Pujiastuti et al., 2020).

The function of parental involvement is also crucial in home-based learning. Learners who receive guidance and encouragement from their parents exhibit greater confidence and success in mathematics, according to research conducted by Aquino et al. (2019), Leander et al. (2021), and Peteros et al. (2019). Limited studies have concentrated on curriculum-aligned digital home-based learning packets that are explicitly designed to enhance Grade 3 division skills within the Philippine context, despite the abundance of evidence supporting digital learning materials and parental scaffolding. This lacuna served as the foundation for the development and assessment of the Digital Home-Based Learning Packet employed in the current investigation.

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METHODOLOGY

Research Design

A quasi-experimental one-group pretest-posttest design was implemented in the investigation. The rationale for selecting this design was that random participant assignment was not feasible. The researcher was able to ascertain whether the implementation of the Digital Home-Based Learning Packet led to a measurable improvement in the division skills of learners as a consequence of the design.

Respondents

A total of two participant groups were involved. Forty Grade 3 Mathematics teachers from the twelve DepEd sub-offices of Morong, Rizal were employed as expert evaluators of the instructional material. Through purposive sampling, they were chosen on the basis of their willingness to participate, familiarity with digital instruction, and a minimum of three years of teaching experience. The intervention and assessment procedures were conducted through total enumeration with nineteen Grade 3 learners from the University of Rizal System–Laboratory Schools.

Research Instrument

The Digital Home-Based Learning Packet, which was created using Canva Presentation, was the primary intervention. The bundle included interactive activities, guided exercises, stories that integrated values, and assessments that focused on division skills. Additionally, the lessons were curriculum-aligned. It is capable of being accessed online or downloaded for offline use.

The content, instructional, and technical integrity of the packet were assessed using the DepEd LRMDS Evaluation Rating Sheet for Non-Print Materials. In order to evaluate learners' division abilities prior to and subsequent to the intervention, a validated 30-item pretest and posttest were implemented. Cronbach's Alpha reliability testing produced values between 0.760 and 0.813, suggesting a high level of reliability.

Data Gathering Procedure

Before conducting the study, the researcher obtained institutional approvals and ethical clearance. The learners were administered the pretest prior to the implementation of the Digital Home-Based Learning Packet. The posttest was administered to learners following the conclusion of the intervention period. The instructional material was evaluated by expert evaluators simultaneously using the standardized evaluation instrument. Data that were collected were tabulated and subjected to statistical analysis.

Statistical Treatment

Descriptive statistics, such as the weighted mean and standard deviation, were employed to characterize the evaluation results and the performance of the learners. The normality of the distribution was ascertained using the Shapiro-Wilk Test. A paired-samples t-test was

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implemented to ascertain whether there were substantial disparities between the pretest and posttest scores, as the data satisfied the normality assumptions.

RESULTS AND DISCUSSIONS

Features of the Developed Digital Home-Based Learning Packet in Grade 3 Division Skills

The Digital Home-Based Learning Packet that was created was intended to address the learning competencies outlined in the DepEd MATATAG Curriculum for Grade 3 Mathematics. Lessons, exercises, drills, and assessments were included in the packet, which addressed division principles, division with and without remainder, estimation of quotients, mental division, and word problems. In order to facilitate the progressive development of skills and the mastery of division concepts, activities were organized in a progressive process from simple to complex.

The packet's incorporation of the "Farm Adventure" theme, which contextualized mathematical concepts through relatable stories and activities, was a notable feature. Throughout the courses, learners were provided with guidance from characters such as Grandfather Toto and Farmer Gela. Contextualization has been acknowledged as an effective instructional strategy due to its ability to establish a connection between the learning content and the experiences of the learners, thereby enhancing their engagement and overall understanding. Learners were able to perceive mathematics as pertinent and meaningful to their daily lives as a result of the implementation of localized and story-based activities.

The packet also included interactive instructional components, such as multimedia elements, self-checking answer keys, navigation controls, and compatibility with multiple digital platforms. These features facilitated independent learning and enabled learners to receive immediate feedback on their responses. These characteristics are in accordance with the principles of Constructivist Learning Theory, which prioritize active participation and knowledge construction through meaningful learning experiences. Similarly, the scaffolded structure of the activities is indicative of Vygotsky's Zone of Proximal Development, as it offers guided support that progressively facilitates learners' independent problem-solving.

The results suggest that the learning bundle that has been developed has attributes that facilitate curriculum alignment, learner engagement, and independent learning. These characteristics indicate that it has the potential to serve as an effective supplementary instructional resource for enhancing the division abilities of learners in both classroom and home-based environments.

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Experts' Evaluation of the Developed Digital Home-Based Learning Packet

Table 1.

Summary of Experts' Evaluation of the Digital Home-Based Learning Packet

Aspect	Mean	Interpretation
Content Quality	4.99	Outstanding
Instructional Quality	4.99	Outstanding
Technical Quality	4.99	Outstanding
Other Findings (Conceptual, Factual, Grammatical, Computational Errors)	4.00	Not Present

The packet's exceptional content quality rating indicates that it was in accordance with the MATATAG Curriculum and provided Grade 3 learners with accurate, pertinent, and developmentally appropriate content. The evaluators notably appreciated the material's relevance to real-life situations, promotion of critical thinking, and logical organization. Curriculum alignment is a critical metric for evaluating instructional efficacy, as it guarantees that learning activities are directly aligned with the intended learning competencies and educational standards.

In the same vein, the material's high instructional quality rating suggests that it effectively facilitated learning through learner-centered instructional approaches, engaging activities, and clearly defined objectives. The positive evaluation was likely influenced by the incorporation of interactive exercises, guided practice, and self-paced learning opportunities. These results corroborate prior research that emphasizes the enhancement of learners' motivation, participation, and academic achievement through the use of technology-enhanced instructional materials.

The multimedia components, visual design, navigation system, and accessibility features were suitable for the intended consumers, as evidenced by the exceptional technical quality rating. The rigor of the material development, pilot testing, validation, and revision processes is also evidenced by the absence of significant conceptual, grammatical, and formatting errors. Collectively, these results verify that the Digital Home-Based Learning Packet is appropriate for instructional implementation and meets quality standards.

Additionally, the evaluators reported that there were no conceptual, factual, grammatical, or formatting errors (M = 4.00). The results of this study suggest that the instructional material that was developed is of a high quality and acceptability.

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Level of Performance of Grade 3 Learners in Division Skills

Test	Mean	SD	Interpretation
Pretest	12.53	5.004	Satisfactory
Posttest	21.79	4.354	Very Satisfactory

The results revealed that learners obtained a pretest mean score of 12.53 (SD = 5.004), interpreted as Satisfactory, and a posttest mean score of 21.79 (SD = 4.354), interpreted as Very Satisfactory. The increase in mean scores indicates that learners demonstrated substantial improvement in their mastery of division skills following exposure to the Digital Home-Based Learning Packet.

The improvement may be attributed to the packet's structured sequence of lessons and activities. By providing guided examples, repetitive practice, and immediate feedback, learners were given multiple opportunities to strengthen their understanding of division concepts and procedures. The self-paced nature of the packet also enabled learners to review lessons according to their individual learning needs, thereby promoting deeper understanding and retention of mathematical concepts.

Another factor that may have contributed to the improved performance is the contextualized and interactive design of the learning material. The use of stories, games, and multimedia elements likely increased learners' interest and motivation to participate in mathematical activities. Increased engagement has been associated with improved academic outcomes because learners become more willing to invest effort and persistence in completing learning tasks.

The findings support Constructivist Learning Theory, which posits that learners actively construct knowledge through meaningful engagement with learning experiences. They likewise validate the role of scaffolding in Vygotsky's Zone of Proximal Development, wherein guided support helps learners accomplish tasks that they may initially find difficult. The results therefore suggest that the Digital Home-Based Learning Packet effectively enhanced learners' division skills and promoted positive learning outcomes.

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Significant Difference Between the Pretest and Posttest Results

Table 3.

Test of Significant Difference Between Pretest and Posttest Scores

Competency	Exposure	Mean	SD	Mean Difference	df	t-value	p-value	Ho	VI
Division Skills	Before	12.53	5.004	9.26	18	14.599	.000	Reject the Null Hypothesis	Significant
	After	21.79	4.354						

It demonstrated the test of significant difference between the pretest and posttest ratings of Grade 3 learners in division skills. According to the findings, the learners achieved a mean score of 12.53 (SD = 5.004) on the pretest and 21.79 (SD = 4.354) on the posttest, resulting in a mean difference of 9.26. The 0.05 level of significance was evidenced by the computed t-value of 14.599 and p-value of.000, which indicated a statistically significant difference between the pretest and posttest scores. As a result, the null hypothesis was refuted. The division skills of Grade 3 learners were substantially enhanced by the implementation of the Digital Home-Based Learning Packet, as indicated by this result.

The statistical analysis revealed a significant difference between the pretest and posttest scores of Grade 3 learners, suggesting that the observed performance improvement was not the result of coincidence. The Digital Home-Based Learning Packet's efficacy as an intervention for enhancing division skills is illustrated by the substantial increase in posttest scores.

The significant difference implied that learners were able to acquire and employ mathematical concepts more effectively than they were prior to the intervention as a result of their exposure to the learning packet. The booklet offered systematic opportunities for self-assessment, reinforcement, and practice, all of which are crucial for the development of conceptual understanding and procedural fluency in mathematics. Learners were also able to develop confidence as they mastered increasingly complex division tasks as a result of the progressive progression of activities.

These results are in accordance with prior research that has documented the beneficial effects of digital learning resources on mathematics achievement. Instructional materials that are multimedia-rich and interactive have been demonstrated to enhance learner engagement, enhance conceptual comprehension, and facilitate independent learning. Similarly, the performance of learners may have been enhanced by the additional scaffolding that parental involvement could have provided through home-based learning activities.

The Digital Home-Based Learning Packet's efficacy in improving the division skills of Grade 3 learners is substantiated by the substantial increase in their scores. These results suggest

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that digital instructional materials that are well-designed can be beneficial interventions for addressing learning deficits in mathematics and promoting learning continuity beyond the traditional classroom environment.

Conclusions

Based on the findings, the following conclusions were drawn: (1) The developed Digital Home-Based Learning Packet is a comprehensive instructional tool that contextualizes division concepts through localized storytelling and interactive digital elements. Its strict alignment with the MATATAG Curriculum ensures that it is not only engaging but also educationally sound for Grade 3 learners. (2) The "Outstanding" evaluation from experts reflects strong evaluation results that the learning packet adheres to the high standards of content, instructional, and technical quality. The result in the other findings revealed that conceptual, factual, and technical errors were "Not Present" (3) The improvement from "Satisfactory" to "Very Satisfactory" suggests that the packet supported learners' mastery of division skills. It may help learners meet the expected competencies in division. (4) The significant difference between the pretest and posttest scores suggests that the Digital Home-Based Learning Packet may contribute to the improvement of Grade 3 learners' division skills. However, the findings should be interpreted within the limitations of the study, particularly the small sample size and absence of a control group. (5) The findings of the study should be interpreted with caution due to certain limitations, including the small sample size, the absence of a control group, and the limited duration of implementation. Despite these limitations, the study provides preliminary evidence that the Digital Home-Based Learning Packet may support the improvement of Grade 3 learners.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are offered: (1) In terms of Curriculum Integration and Expansion, since the material suggested effectiveness for division, curriculum developers and master teachers are encouraged to expand the digital packet's scope to cover the entire Grade 3 Mathematics curriculum (1st to 4th quarters). This ensures a consistent and seamless transition of skills across all MATATAG Curriculum competencies. (2) With regard to Instructional Diversification, it is recommended that a "Teacher's Edition" or a classroom optimized version be developed. While effective for home-based learning, the material's interactive nature makes it a potent aid for face-to-face instruction, allowing teachers to use it for classroom drills and remedial sessions. (3) For Capacity Building for Educators, schools should provide professional development sessions and hands-on training for teachers in digital content authorship. Emphasizing tools like Canva for story-based and gamified materials will empower educators to create localized resources for other challenging subject areas. (4) In terms of Strengthened Home-School Partnership, Tto sustain the effectiveness of the homebased tools, schools should conduct orientation programs for parents and guardians. This will equip them with the necessary coaching skills to utilize the packet's "User Guide" and "Answer Key" features effectively, fostering a more supportive learning environment at home. (5) For Research Continuity, future researchers may build upon

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this study by conducting longitudinal research to test the long-term retention of division skills. Furthermore, the framework of this digital packet specifically its "Farm Adventure" contextualization can be adapted and tested for other grade levels and diverse learning contexts.

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