Innovating Math Instruction: Using the Japanese Multiplication Method (Jamm) in Teaching One-Digit Multiplication to Grade 4 Learners

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ABSTRACT

Mastering multiplication was a crucial mathematical skill needed by elementary learners, yet many Grade 4-Earth learners struggled with memorization and recall, prompting the need for alternative methods such as the Japanese Multiplication Method to enhance their learning experience. This participatory action research aimed to address the challenges faced by Grade 4 learners in mastering multiplication due to poor memory and recall. The purposely selected participants included eight learners—three boys and five girls—who were identified through interviews with their adviser and a review of archival records. Data were gathered using observation guide, researcher's journals, and interviews. The findings showed that the Japanese Multiplication Method was highly favored by the learners as an alternative approach to traditional multiplication strategies because it was easier, more efficient, faster, and more enjoyable. The results suggested that this intervention significantly enhanced learners' one-digit multiplication skills, providing a more effective and engaging method for improving their mathematical competencies. The implications of this study highlighted the potential for using this method to boost learners' ability to perform one-digit multiplication, thus contributing to better academic outcomes in Mathematics.

Keywords: Japanese Multiplication Method in Mathematics, Enhancing One-Digit Multiplication Skills, Learning Strategies of Grade 4 Learners

INTRODUCTION

Multiplication, alongside addition, subtraction, and division, is one of the four fundamental arithmetic operations and a critical skill for Grade 4 learners to master. However, during an interview with the Grade 4 teacher of Consolacion Celo-Palmares Elementary School in the second quarter of School Year 2023–2024, it was revealed that about 40 percent of Grade 4-Earth learners (8 out of 20) struggled with multiplication. These learners had not mastered the multiplication table, performed slowly, and showed weak competency in one of the four basic operations. The shift in learning modalities during the COVID-19 pandemic further contributed to these gaps.

Because of these difficulties, the teacher was unable to proceed to the next lessons, as instructional decisions required reteaching multiplication to ensure learners met the required competency. Many learners resorted to using lines and counting instead of recalling multiplication facts, confirming their lack of mastery. Recognizing the severity of this challenge, the teacher-researchers sought an alternative strategy to strengthen learners' multiplication skills.

To address this, the Japanese Multiplication Method (JaMM) was introduced. Originally used in Japan, JaMM is a visual strategy that represents multiplication through parallel lines and dots, simplifying the process into counting. This method provides an alternative for learners who struggle with memorization, allowing them to perform multiplication more accurately and with greater confidence. Its primary objective is to help learners multiply one-digit numbers even without recalling multiplication tables, while promoting critical thinking through consistent application of rules and procedures.

This study is anchored in the Department of Education's Basic Education Research Agenda (DepEd Order No. 39, s. 2016), particularly under the domain of Teaching and Learning, as it directly addresses learner needs in mathematics. It also aligns with the Department's intermediate outcomes on enabling mechanisms: EM3, which emphasizes creating an ideal environment and providing adequate learning resources, and EM4, which highlights efficiency and responsiveness in teaching processes. Moreover, it conforms to the Regional Education Research Agenda (Regional Memorandum No. 329, s. 2023), specifically on curriculum delivery, learning resource management, and interventions in numeracy.

Through this study, the JaMM was presented as a practical solution to improve Grade 4 learners' multiplication competency. By moving beyond rote memorization, it aimed to foster both fluency and understanding, transforming multiplication from a source of frustration into a more engaging and meaningful learning experience.

METHODS

This study employed Participatory Action Research (PAR). According to MacDonald (2012), PAR is a qualitative approach that is democratic, equitable, liberating, and life-enhancing. It promotes collaboration between researchers and participants, ensuring that the voices and experiences of all involved are valued. In this study, the process was designed to allow both learners and teacher-researchers to participate actively in addressing the challenges related to multiplication.

The participants consisted of eight Grade 4 learners—three males and five females—who were purposively selected based on their difficulties in multiplication and memorization. To be included, participants had to meet specific criteria: they must be current Grade 4 learners during the second quarter of school year 2024–2025, aged 9–10 years, with parental consent, willing to participate, and experiencing difficulty in multiplying one-digit numbers. All eight learners resided in Brgy. Dalid, Calinog, Iloilo. Three female teacher-researchers also took part in the study. They were fourth-year Bachelor of Elementary Education students at West Visayas State University–Calinog Campus, with two residing in Brgy. Cabudian, Duenas, Iloilo, and one in Brgy. Gines, Lambunao, Iloilo. These teacher-researchers played crucial roles in facilitating, guiding, and monitoring the intervention throughout the study.

Primary data were gathered through interviews with the learner-participants regarding their experiences in multiplication, while secondary data were collected from the observation guides and reflective journals of the teacher-researchers. The intervention employed was the Japanese Multiplication Method (JaMM), which uses lines and intersections to solve multiplication problems, simplifies the process into counting, and helps learners visualize multiplication concepts. This method was introduced as an alternative strategy for learners who struggled with memorization of multiplication tables, with the aim of improving both competence and confidence in solving mathematical problems.

The JaMM Mastery Program was implemented over four weeks during the second quarter of school year 2024–2025. Before implementation, the researchers prepared visual aids and conducted interviews to capture learners' prior experiences in multiplication. During implementation, the program was carried out twice weekly through classroom sessions that combined demonstrations, guided practice, and independent exercises. Both learners and teachers were introduced to the steps of JaMM, after which the learners actively applied the method to solve problems. Post-implementation interviews were then conducted to capture learners' reflections on their experiences, and tokens of appreciation were given to both the learners and teachers. The entire intervention took place in the Grade 4-Earth classroom of Consolacion Celo-Palmares Elementary School, which provided a conducive learning environment.

This study was anchored on Rogers' (1962) Diffusion of Innovation Theory (DOI), as cited by Toufaily et al. (2021), which explains how new ideas and practices spread within a social system. The theory's adopter categories—innovators, early adopters, early majority, late majority, and laggards—were applied to better understand how the learners accepted and applied JaMM in solving multiplication problems. Through this program, learners were expected to master one-digit multiplication, gain confidence in their mathematical

abilities, and approach learning with greater enthusiasm, while teachers benefited from a more engaging and effective strategy that reduced the need for extensive remedial sessions.

DISCUSSION OF RESULTS AND REFLECTIONS

This section provides the analysis and interpretation of the results of the study.

Learner-Participants' Capabilities and Experiences in Multiplying One-Digit Numbers Before, During, and After the Intervention

Theme	Description	Evidence/s	Supporting Literature
Challenges with Memorization and Recall (Before the intervention)	All eight (8) learner-participants expressed difficulty in memorizing and recalling the multiplication table. Their tendency to forget even basic multiplication facts compelled them to rely on alternative strategies. This consistent struggle with retention negatively affected their speed and confidence in performing multiplication tasks.	Annie (9) noted that while she "can memorize [the multiplication table] a little bit," she "would forget it quickly," making it hard to retain multiplication facts for long. Gim (9) acknowledged that he "still needed to count" when solving multiplication problems and that he "always forgets the multiplication table," reflecting a struggle with both recall and speed.	Ashcraft (2002), weak multiplication fact recall can significantly affect overall mathematical fluency, leading to slower computational speed and higher cognitive load in solving problems. Booth et al. (2014) emphasize the importance of conceptual approaches and alternative strategies to improve multiplication skills, as traditional rote memorization may not be effective for all learners. .
Increased Speed and Ease of Multiplication (During the intervention)	Six out of the eight learner-participants stated that the Japanese Multiplication Method (JAMM) made solving multiplication problems faster and easier. They appreciated that it reduced the need for intense thinking or memorizing multiplication tables.	Annie (9) shared that she was more confident and efficient in multiplying while using JaMM during their practice sessions in the implementation. Tannie (9) also expressed that JaMM made her calculations quicker and smoother because she "don't need to think hard" while multiplying. Ara (9) highlighted a specific advantage, mentioning that JaMM is "faster compared to drawing lines individually," making it a more convenient approach.	Juliana and Lester (2022) investigated the impact of JaMM on pupils' interest in mathematics. The findings revealed a significant increase in engagement and enthusiasm among learners taught using JaMM compared to those instructed with conventional methods.

Learner-Participants' Overcoming Educational Challenges

Before, During, and After the Intervention

Theme	Description	Evidence/s	Supporting Literature
Overcoming Learning	Introducing an unfamiliar method to learners often prompts initial skepticism,	Due to the unfamiliarity of the learners, we had to explain the steps as simply as possible and	Lampert (1986) highlights that students initially struggle with conceptualizing multiplication

Barriers (Before the intervention)	and this was a key challenge faced by the teacher-researchers during the implementation of the Japanese Multiplication Method. The skepticism the learners showed were changed by optimism through the help of the teacher-researchers who stayed by their side, helping them grasp the concept and apply the method effectively	give them enough time so they could understand it." significant changes in the learners while they were doing the activity using the JaMM." "They were faster in using the method, showing how familiar they had become."	beyond rote memorization, which may contribute to their reluctance to accept alternative strategies. Groves et al. (2016) found that in Australian classrooms, the introduction of Japanese teaching methods was met with skepticism, primarily because students and teachers alike were accustomed to conventional Western approaches.
Learners Engagement and Enjoyment in Learning (During the intervention)	The learner-participants became more confident, engaged, and enthusiastic about learning, as seen in their increased speed, smiles, and eagerness to continue solving problems beyond the allotted time. These behaviors and reflections clearly illustrate the learners' growing confidence, enjoyment, and engagement with the activity, as expressed in the following statements:	"Often, they would ask for more equations to be answered despite consuming all the time we had, and that makes us happy because it shows how much they love doing our activity." "They were faster in using the method, showing how familiar they had become." "The learners' enthusiasm was evident as they eagerly participated and showed excitement in solving more problems."	Mandernach et al., (2011), when students are motivated to do well in their courses, involved or invested in their desire to learn, and willing to exert the effort expected by their instructors, they are more likely to be engaged in their education.
Increased Confidence and Positive Attitude Toward Math (After the intervention)	Thelearner- participants expressed greater confidence in their multiplication skills after using the Japanese Multiplication Method (JaMM). Their feedback highlighted how the visual patterns made multiplication easier to understand, reducing frustration and fostering a more positive attitude toward math.	"They mentioned that the visual patterns helped them understand the process better, and the method made multiplication less intimidating." "Many participants said that JAMM was much easier than traditional methods." "One of them even said, 'Manami kag mahapos' (it's good and easy)." "They felt that multiplication was easier and they no longer felt confused or frustrated." "The feedback wasvery positive."	Boaler and Selling (2017), incorporating visual and interactive strategies in mathematics education enhances student engagement, particularly when dealing with complex concepts. Boaler, 2016. Studies by Cai et al. (2017) have also indicated that visual-based problem-solving methods in mathematics lead to increased student confidence and motivation, reducing math anxiety and improving performance.

Potential Challenges and Limitations

The Japanese Multiplication Method (JaMM) has proven to be an effective way to make math more enjoyable and to help learners gain confidence, but there are still some challenges in using it more widely. Teachers need proper orientation and training so they can apply the method correctly and see it as a helpful tool rather than just an extra activity. Time is also a factor since JaMM can take longer than the traditional way of multiplying, especially with bigger numbers, and this may be difficult to manage within a packed class schedule. Another point to consider is that not all learners learn in the same way—visual learners may find it easier, but some may still prefer symbolic or abstract methods. Standardized tests, which often focus on speed and accuracy, may also discourage the use of JaMM because its exploratory style does not always match what the tests require. Finally, without enough support from schools and DepEd, the method may only be used by individual teachers, which could make its application inconsistent.

From a theoretical perspective, JaMM works well because it connects numbers with visual images, supporting dual coding theory, which helps memory and understanding. It also fits constructivist principles by letting learners build knowledge through hands-on exploration rather than memorization. JaMM can reduce mental strain by giving visual support, though it may become overwhelming with larger problems, as explained by cognitive load theory**.** It also caters to students with strong visual-spatial intelligence, offering them a clearer path to learning math. Finally, the sense of success and confidence that learners gain from JaMM reflects Bandura's self-efficacy theory**,** showing how positive experiences build motivation and persistence in learning.

Reflections on Teaching Practice

This action research has reshaped our perspective on teaching multiplication. We discovered that while memorization has its place, it is not always the most effective or inclusive strategy. The Japanese Multiplication Method (JaMM) offered learners a fresh and engaging way to understand multiplication, but it also came with challenges. Some students initially found the process of drawing lines time-consuming, and as teachers, we often felt the pressure of limited class periods. To address this, we used JaMM as a visual introduction and reinforcement tool, while still incorporating traditional drills for practice and efficiency. This approach allowed us to balance classroom realities with deeper learning opportunities.

The impact, however, went beyond strategies. Quantitative results showed clear gains in learners' pre- and post-test scores, while qualitative observations revealed something even more encouraging: increased participation, reduced anxiety, and a sense of accomplishment among students who once struggled with multiplication. These outcomes reminded us that innovative methods, when thoughtfully adapted, can empower learners not only to improve their skills but also to believe in their own ability to succeed in mathematics. Moving forward, we are committed to blending traditional and research-based practices that meet diverse learning needs and create more meaningful classroom experiences.

CONCLUSION AND RECOMMENDATION

Traditional memorization-based strategies hinder learners' confidence and speed in multiplication. The Japanese Multiplication Method (JaMM) proved to be a more engaging, structured, and visual approach, improving learners' fluency, confidence, and enjoyment in solving one-digit multiplication. Despite its effectiveness, the study's small sample and short duration limit generalization. Broader studies with larger samples and quantitative measures are needed to better understand JaMM's long-term impact on mathematical proficiency.

In light of the findings, the following are recommended: The Department of Education may introduce the Japanese Multiplication Method (JaMM) as an alternative for one-digit multiplication to support learners struggling with memorization. JaMM can be integrated into the math curriculum and adopted by teachers to create a more engaging, learner-friendly approach. Its inclusion in classroom activities and community-based learning centers can enhance confidence, speed, and accuracy in multiplication. Further research is also encouraged to explore JaMM's long-term impact and applicability across diverse learners.

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