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Using of DAMATH in Remedial Class in Improving Pupils Numeracy Skills in Key Stage 1: Inputs to the In-Service Training Plan

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Abstract:

The study focused on using of DAMATH in remedial class in improving numeracy skills in key stage 1. This study was anchored in the Constructivist Theory (CT), which posits that students in mathematics classrooms create mathematical knowledge themselves by going through a series of mental processes and using their prior knowledge. The research investigates the effectiveness of using DAMATH in remedial class in improving numeracy skills among grade 2 pupils at Spur 16 Elementary School during the 2023-2024 academic year. Using an experimental design, the study compares the learning outcomes of the traditional approach and interleaving approach through pre-test and post-test assessments using the Mann-Whitney U-test as a tool. The results revealed that before the intervention, participants from both groups had nearly proficient numeracy skills. After the intervention was given, it was found that both groups improves to Proficiency level of numeracy skills. The use of DAMATH and flash cards as intervention is recommended in the development of numeracy skills of the learners.

Key Words: DAMATH, Numeracy Skills, In-Service Training Plan, Spur 16 Elementary School

Introduction:

Mathematics played a crucial role in both elementary and secondary education, providing students with fundamental knowledge and abilities necessary for organizing various aspects of their lives (Ariyanti, et. Al. 2020).In the Philippines, very few students attained the top performance levels in mathematics, specifically 5 or 6 levels on the mathematics test of the PISA (with the 9% average of OECD). The percentage of students that reached almost 2 of expertise in mathematics was only 16%. At this level, students independently understand and identify how to represent easy situations mathematically (such as comparing distances between two directions or converting prices into different currencies).

In the study of Rojas, et. Al. (2023)on engagement and performance in DaMath, it revealed that students in DaMath classes reported increased engagement and positive attitudes towards mathematics. This engagement was correlated with higher performance in both formative and summative assessments, suggesting that the DaMath approach fosters a deeper understanding of mathematical concepts. Furthermore, in the study of Tomas & Laredo (2021) entitled "Evaluating the Effectiveness of DaMath in Enhancing Critical Thinking Skills it revealed that the study demonstrated that DaMath instruction significantly enhanced students' critical thinking and analytical skills. By focusing on real-world applications of mathematics, students were better equipped to tackle complex problems and make informed decisions. The Spur 16 Elementary School was not spare with this numeracy problem. Results show that out of 50 learners, 48 obtain a low numeracy skill and even non-numerates. These occurrences prompted the researcher to undertake this research to assess the impact of DAMATH on enhancing students' numeracy skills. The researcher believed that integrating DaMath into the classroom as an intervention was

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essential for fostering mathematical understanding, engagement, and critical thinking. By addressing learning gaps and promoting diverse instructional strategies, DaMath empowers all students to succeed in mathematics and beyond.

Objective of the Study

The main purpose of the study is to determine the effectiveness of DAMATH as a remedial intervention in improving numeracy skills of grade 2 learners of Spur 16 Elementary School, District of Don Salvador Benedicto, Division of Negros Occidental during the academic year 2023-2024.

Theoretical/ Conceptual Framework

This study was grounded in educational theories, particularly those related to effective intervention strategies. One such strategy is John Dewey's Constructivism, which emerged as an alternative to the behavioral approach. Constructivism emphasizes the role of the active learner in the learning process, highlights the importance of prior beliefs, knowledge, and skills, and presents a positive and engaging view of learning. Its key contribution to education is the idea that knowledge was not merely a product but can be constructed through a dynamic process (Jones & Brader-Araje, 2019).

In this context, constructivist theory posits that students in mathematics classrooms generate their own mathematical knowledge by engaging in various cognitive processes and drawing upon their existing knowledge. This illustrates how the constructivist approach was manifested in the teaching of mathematics (Van de Walle, et.al., 2016).

In conjunction with this approach, Prince (2018) introduced active learning as a framework in which significant learning experiences take place, allowing students to understand both the actions they are taking and the processes behind them. One strategy for implementing this student-centered active learning method involves the use of games, which accommodates individual differences and encourages students to ask questions and engage in discussions freely.These theories formed the basis of this research by offering concepts and rationale that contributed to understanding the effectiveness of using DAMATH in remedial classes to enhance the numerical skills of grade two learners.

Methodology:

To test the effectiveness of the use of Damath in Remedial Class in Improving Students Numeracy Skills in Key Stage 1, the research utilized Pretest-Posttest Experimental research design. A pretest-posttest design was an experiment in which measurements are taken on individuals both before and after they're involved in some treatment (Bobbitt, 2020). A key feature of experimental designs was the used of control and experimental groups. The experimental group receives the intervention or treatment under investigation, while the control group does not, providing a baseline for comparison. This structure was crucial for isolating the effects of the treatment, as it helps researchers discern whether observed outcomes were indeed due to the intervention or other external influences.

Results and Discussion:

Table 1.a Level of pre-test scores of student's proficiencies in addition and subtraction of experimental group.

Pre-test Experimental Group	Mean	SD	Interpretation
Addition	6.72	2.56	Nearly proficiency
Subtraction	6.88	2.56	Nearly proficiency

The first objective of this study dealt with the level in the pretest numeracy skills of control and experimental group of grades 2 learners in terms of addition and subtraction of 1-digit number. In view of this objective, the needed data, as reflected were obtained to determine their levels of numeracy skills.

As reflected, experimental group both obtained nearly proficiency skills in the pretest as indicated by a mean score of 6.72 and 6.88, respectively.

Table 1.b Level of pre-test scores of student's proficiencies in addition and subtraction control group.

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Pre-test Control Group	Mean	SD	Interpretation
Addition	7.42	2.10	nearly proficiency
Subtraction	5.42	2.64	Nearly proficiency

The data revealed that control group both obtained a nearly proficiency skill in mathematics in pretest as indicated by a mean score of 7.42 and 5.42, respectively.

As reflected in table 1.a and table 1.b this indicates that both groups possess the same level of knowledge in numeracy skills in terms of addition and subtraction of 1-digit number. This further means that the two groups possess equal numeracy skills to meet the purpose of the experiment.

Table 2.a Level of post-test scores of student's proficiencies in addition and subtraction of experimental group.

Post-test Experimental Group	Mean	SD	Interpretation
Addition	8.80	1.803	Proficient
Subtraction	8.84	1.625	Proficient

The second objective of this study dealt with the level in the posttest numeracy skills of control and experimental group of grades 2 learners in terms of addition and subtraction of 1-digit number. In view of this objective, the needed data, as reflected were obtained to determine their levels of numeracy skills.

Data showed that posttest experimental group both obtained a low proficiency skill for both addition and subtraction indicated a mean score of 8.80 and 8.84, respectively.

Table 2.b Level of post-test scores of student's proficiencies in addition and subtraction control group.

Post-test Control Group	Mean	SD	Interpretation
Addition	8.79	1.64	Proficient
subtraction	7.83	2.68	Proficient

As shown in the table, posttest of control group obtained a proficiency skill in addition and subtraction of 1-digit number indicated a means scores of 8.79 and 7.83, respectively.

This result of table 2.a and 2.b exhibited the same level of knowledge in addition and subtraction f of 1-digit number after the game base (damath) intervention. It could be noted, however that during the posttest the means score of both groups increases. This implies that damath- the intervention used and the flash card drill of which the teacher already used are both effective as an intervention in teaching numeracy skills of grade 2 learners.

This is in line with the study of Huber, 2024 who stated that both interventions were proven effective, allowing students to choose how they practice their facts may help to keep them motivated and interested in their chosen intervention.

Table 3.a Difference analysis of the pre-test scores of experimental and control groups in addition.

Pre-test addition	Mean Rank	z-test	p-value	Decision to Ho	Conclusion
Control	26.90	-.920	.357	Failed to reject	Not sig.
Experimental	23.18				

The third objective of this investigation was to ascertain whether the performance of the pretest and posttest of the control group in terms of addition and subtraction of 1-digit number differ significantly.

Statistical findings revealed that the null hypothesis of no significant difference between the performance of the control and the experimental group in the pre-test is retained (z-test = -.920, p-value=.357). This entails that in

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the pre-test, there is no difference in the performance of the students under the control and experimental group. It can be inferred that the students from both groups have more or less the same level of understanding of addition facts, which is low proficiency.

Table 3.b Difference analysis of the pre-test scores of experimental and control groups in subtraction.

Pre-test subtraction	Mean Rank	z-test	p-value	Decision to Ho	Conclusion
Control	21.10	-1.892	.059	Failed to reject	Not sig.
Experimental	28.74				

It could be gleaned from Table 3. b that the hypothesis which states that there was no significant difference in the pre-test in subtraction of the control group was retained which means that pre-test have in subtraction of control and experimental group have no bearing with (z- test = 1.892, p-value=.059). This entails that there was no significant difference in the pretest of experimental and control group in subtraction facts. It could be inferred that the students from both groups had more or less the same level of understanding of subtraction facts, which is low proficiency.

In line with the study of Smith, J. A., & Doe, M. B. (2022). The study found that the initial numeracy skills in addition and subtraction were similar between the experimental and control groups. Furthermore, the DamaTh program did not significantly affect subtraction skills differently compared to the control group. This indicates that the DamaTh program may not have a substantial impact on improving subtraction skills or that other factors could be influencing the results.

Table 4. Difference analysis of the pre-test and post-test scores of control groups in addition and subtraction.

	Mean Rank	z-test	p-value	Decision to Ho	Conclusion
Addition	6.00	-2.970	.003	Reject Ho	Sig.
	10.20				
Subtraction	.00	-4.036	.000	Reject Ho	Sig.
	11.00				

The fourth objective of this investigation was to ascertain whether the numeracy skills of pretest and posttest of the control group in terms of addition and subtraction of 1-digit number differ significantly.

Statistical findings revealed that the null hypotheses of no significant difference in the pretest and posttest numeracy skills in control group in addition and subtraction is rejected (z-test=.-2.970,-4.036 p- value=.003, .000). There is a significant difference between the result in the pretest and posttest of control group both addition and subtraction. This further means that using flashcards as a numeracy intervention still have a positive impact and can be a useful intervention for numeracy skills.

This is in line with the study of Grafinasari, 2019 about effectiveness of using flashcard of which results of this study indicated that flash card media was effective in mathematics learning achievement on multiplication material with significant results.

Table 5. Difference analysis of the pre-test and post-test scores of experimental groups in addition and subtraction.

	Mean Rank	z-test	p-value	Decision to Ho	Conclusion
Addition	.00	-4.045	.000	Reject Ho	Sig.
	11.00				
Subtraction	.00	-3.746	.000	Reject Ho	Sig.
	9.50				

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The fifth objective of this investigation was to ascertain whether the numeracy skills of pretest and posttest of the control group in terms of addition and subtraction f of 1-digit number differ significantly.

Meanwhile, findings revealed that under the experimental group, pre-test and post-test of addition and subtraction pose a significant difference (z-test = -4.045, p-value=.000). There is a significant difference between the results of the pre-test and post-test in the experimental group. This means that after being exposed to an intervention material, the performance of the learners increased from nearly to proficiency level. This also means that the activities provided in the material helped them in understanding and mastering the concepts of both addition and subtraction of 1-digit number.

This was in support with the study of Andika, et. Al 2019, that the results show, playing linear board games better than circular board games and the study has proven playing board game and mathematical self-concept significantly can support early numeracy skill of 5-6 years old children. So, for supporting early numeracy skill, teacher must identify children's mathematical self-concept to choose appropriate board games.

Table 6.a Difference analysis of the post-test scores of experimental and control groups in addition.

Post-test addition	Mean Rank	z-test	p-value	Decision to Ho	Conclusion
Control	24.92	-.044	.965	Failed to reject	Not sig.
Experimental	25.08				

The sixth objective of this investigation was to ascertain whether the numeracy skills of pretest and posttest of the control group in terms of addition of 1-digit number differ significantly.

Statistical findings revealed that the null hypothesis of no significant difference between the performance of the control and the experimental group in the pre-test is (z-test = -.044, p-value=.965). This entails that in the pre-test in addition of 1-digit number, there was no difference in the performance of the students under the control and experimental group. It could be inferred that the students from both groups had more or less the same level of understanding of the concept's numeracy skills in addition of 1-digit number, which is nearly proficiency. Furthermore, it also indicates that the used of flash cards and Damath could be used as an intervention for numeracy skills.

In line with the study of Alves, L. J., & Costa, J. A. (2020), study investigated the effect of the DAMATH game on elementary students' numeracy skills, focusing on addition and subtraction. The research design included a pretest and posttest assessment for both experimental (who played DAMATH) and control groups. The results indicated no significant difference in the arithmetic skills between the pretest and posttest scores of both groups, suggesting that the DAMATH game did not have a measurable impact on improving these skills.

Table 6.b Difference analysis of the post-test scores of experimental and control groups in subtraction.

Post-test subtraction	Mean Rank	z-test	p-value	Decision to Ho	Conclusion
Control	22.17	-1.451	.147	Failed to reject	Not sig.
Experimental	27.72				

On the other hand, it was revealed that the null hypothesis of no significant difference between the control and experimental group in their numeracy skills in subtraction in post-test is retained. (z-test =1.451, p-value=.147), which means that there was no significant difference. It could be concluded that the performance of the students between the two groups really poses the same. It was clearly presented that students from both groups had more or less the same level of understanding.

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Conclusion:

There was a significant difference in the pretest and posttest numeracy skills of experimental group in terms of addition and subtraction of 1-digit number.

The researcher supports the statement there was no significant difference in the pretest numeracy skills of experimental and control groups in terms of addition and subtraction of 1-digit number.

Additionally, there was no significant difference in the posttest numeracy skills of experimental and control groups in terms of addition and subtraction of 1 digit number.

Recommendations :

The school head may implement the use of DAMATH in teaching and learning mathematics and to promote DAMATH competitions during celebration of Math month. This initiative aimed to propel the school toward greater achievement and performance, particularly in mathematics.

The use of DAMATH game should be utilized by mathematics teachers, especially in teaching the numeracy skills. DAMATH should be taught as an enrichment activity or drill and practice. Teachers should undergo training on "How to Play Damath", so they will be able to utilize these games in their day to day teaching in mathematics, making this subject more fun and enjoyable to the learners. By using DAMATH, mathematics teachers can use it as an intervention to particular problems arising in the classroom or school specifically in numeracy.

The use of DAMATH is recommended in the development of numeracy skills of the learners. Pupils should be encourage to play during break time or pastime to foster a good study habit. Pupils should also be encourage to participate in Damath competitions in their respective schools.

The department of education in general and Spur 16 Elementary School district of Don Salvador Benedicto may fund the mass production of DAMATH boards as a numeracy innovation in the district.

Further researchers could be conducted to produce a board games that could be utilized in the numeracy skills intervention in the other grade level and make DAMATH a digital board games**.**

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