Enhancing Elementary Mathematics Learning through Taragutog: A Game-based Intervention for Multiplication Skills

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ABSTRACT

Aims: This study was conducted to determine the effect of taragutog in the multiplication skills of the grade V learners of Luna Central School. Specifically, this study aimed to answer the following questions: (1) What is the level of performance in the pre-test of the following: (a) control group? (b)experimental group? (2) What is the level of performance in the post-test of the following: (a) control group? (b)experimental group? (3) Is there a significant difference between the pre-test and post-test of the control group? (4) Is there a significant difference between the pre-test and post-test of the experimental group? (5) Is there a significant difference between the pre-tests of the control and experimental group? (6 Is there a significant difference between the post-tests of the control and experimental group?

Study Design: This study used descriptive-quasi experimental design using pre-test and post-test to the control and experimental group.

Place and Duration of Study: This was conducted at Luna Central School, Poblacion, Luna, Apayao, School Year 2022 – 2023.

Methodology: Mean, frequency and percentage were used to show the level of performance in the pre-test and post-test of the control and experimental group. Pearson – R was used to show the comparison of the pre-test and post-test of the control group, the pre-test and post-test of the experimental group, the pre-tests of control and experimental group, the post-test of the control and experimental group.

The respondents of the study were the forty-eight (48) Grade V learners of Luna Central School. Twenty-four (24) learners were from the control group (section blue) and twenty-four (24) learners were from the experimental group (section pink).

Results: In the pre-test, the control group exhibited a range of scores from 6 to 20, with the majority of participants falling into the "Average" and "Moderately Low" performance categories. The mean pre-test score for the control group was 11.9167, with a standard deviation of 2.79622. On the other hand, the experimental group had a similar distribution of scores in the pre-test, with a mean score of 11.6250 and a slightly lower standard deviation of 1.83712. In the post-test, the control group showed a significant improvement, with a mean score of 20.2083 and a standard deviation of 2.24537. The experimental group, which employed the use of taragutog, exhibited even higher post-test scores, with a mean score of 21.5417 and a slightly higher standard deviation of 2.39527. Statistical analysis revealed that the improvement in the control group's post-test scores was statistically significant, as evidenced by a *P-value* of 0.000. Similarly, the experimental group's post-test scores were significantly higher than the control group, with a p-value of 0.048. These findings suggest that both the control and experimental groups demonstrated an increase in performance from the pre-test to the post-test. However, the experimental group, which utilized the taragutog intervention, exhibited a greater improvement in learning outcomes compared to the control group. This indicates the potential effectiveness of incorporating game-based interventions, like taragutog,

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in enhancing student performance.

Conclusion: The comparison of pre-test scores indicated that the control and experimental groups were initially similar in terms of their baseline performance. However, the post-test scores revealed a significant improvement in both groups, with the experimental group achieving higher scores. Taragutogisa game-based intervention used to address the deficiencies of learners in multiplication. This game is essential and important to use because this a cultural-based game and is widely known in the Philippines.

DEFINITIONS, ACRONYMS AND ABBREVIATIONS

Gamification. A strategy in teaching using games.

Taragutog. A game in the Philippines that is commonly played in fairs and during fiestas and the cubes were labeledwith numbers.

1. INTRODUCTION

Mathematics is a vital tool in many fields worldwide (Agbata et al., 2024). In the educational context, mathematics is one of the compulsory subjects that is taught at elementary schools (Udjaja et al., 2018). Research indicates that students often struggle with mathematics due to various factors, including instructional methods and learning environments. In general, learners think that mathematics is one of the hardest subjects because of varied formulas and multiple steps on answering the problems (Udjaja et al., 2018). These problems of learners can be addressed by making their learning process enjoyable and interesting. The difficulty in helping learners learn in mathematics is twofold: one is to motivate them to want to spend time and engage in mathematical activities, the other is to aid them cognitively to construct mathematical knowledge (Song, n.d.). One of the theories to improve the performance in mathematics is by the integration of fun while learning (Lanuza, 2020).

Appiah, n.d. Games or gamification has become a popular approach to encourage and influence specific behaviors in todays' generation, to increase motivation and engagement of learners (Song, n.d.). Research shows that game-based strategies in teaching helped learners gain a better understanding of the underlying mathematical concepts and led to statistically significant improvement on test scores. "Gamification has been widely used to design better educational systems aiming to increase students' concentration, motivation, engagement, flow experience, and others positive experiences. With advances in research on gamification in education, over the past few years, many studies have highlighted the need to tailor the gamification design properties to match individual students' needs, characteristics and preferences" (Oliveira et al., 2023).

"Games for entertainment have been shown to be able to motivate learners to stay engaged over long periods through a series of game features that are of a motivational nature. These features include incentive structures, such as stars, points, leaderboards, badges, and trophies, as well as game mechanics and activities that learners enjoy or find interesting" (Plass et al., 2015).

Research indicates that students often struggle with mathematics due to various factors, including instructional methods and learning environments (Sherman et al., 2019).

"In the global perspective, a study showed that students' mathematics performance is one of the main concerns in mathematics education. Nevertheless, many students perceive mathematics as one of the difficult core subjects to be learned" (Bernardo et al., 2022).

In the Philippines, have shown that Filipino students consistently perform below satisfactory levels in mathematics, as evidenced by low scores in national assessments such as the National Achievement Test (Racca et al., 2016). "Filipino students were among the lowest performing groups of students among all the participating countries in the 2018 Programme for International Student Assessment (PISA). In mathematics, less than 20% of students demonstrated the minimum proficiency level (Level 2), while more than 50% showed very low proficiency (below Level 1). Scoring below the lowest level of proficiency in the PISA, these Filipino students have been clearly left behind in terms of mathematics education; more than half of this age group of Filipino students have

inadequate mathematical skill compared to their peers in other parts of the world. The poor performance in mathematics also varied in degree between the students in public and private schools, where the means were 343 and 395, respectively" (Department of Education, 2019).

In the Cordillera Administrative Region, studies have also identified significant gaps in mathematics performance among students. Research conducted at the Philippine Science High School in Northern Luzon indicated a correlation between students' English language proficiency and their academic performance in mathematics, suggesting that language barriers may compound difficulties in understanding mathematical concepts (Racca&Lasaten, 2016).

In the province of Apayao, a study showed difficulty on the part of the learners in grasping General Mathematics concepts as documented in different educational context which affects their academic performance (Herrera, n.d.).

In Luna Central School, 52% of the learners were not performing well in mathematics. Assessment like BILANG 2022 results show that these learners fall in developing level which requires an intervention.

In this study, the researcher used game-based strategies in teaching. Taragutog is a game in the Philippines that is commonly played in fairs and during fiestas. The researcher modified the numbers to mathematical sentences. The first and third cube contains numbers in its 6 faces. The second or middle cube contains the operation to be used. The taragutog game starts when the teacher pulls the rope and the cubes will drop. Once the cubes come to stop, the two players will answer the numbers shown by the cubes. The first to give the correct answer gets a point.

With the use of taragutog, learners will enjoy the game and at the same time learn the concept of multiplication. Taragutog could address the deficiencies in learning mathematics especially in the multiplication skills of the learners. The game was designed to make learning multiplication more interactive and enjoyable. This potentially increases the learners' engagement and motivation in learning.

This study highlights taragutog as a culturally relevant game-based intervention to improve multiplication skills. It addresses persistent challenges in mathematics education and contributes to research on gamification by

demonstrating significant learner performance gains.

This study aimed to determine the effect of taragutog in the multiplication skills of the grade V learners of Luna Central School. Specifically, this study aimed to answer the following questions: (1) What is the level of performance in the pre-test of the following: (a) control group? (b)experimental group? (2) What is the level of performance in the post-test of the following: (a) control group? (b)experimental group? (3) Is there a significant difference between the pre-test and post-test of the control group? (4) Is there a significant difference between the pre-test and post-test of the experimental group? (5) Is there a significant difference between the pre-tests of the control and experimental group? (6 Is there a significant difference between the post-tests of the control and experimental group?

This tested the following null hypotheses. (1) There is no significant difference between the pre-test and post-test of the control group. (2) There is no significant difference between the pre-test and post-test of the experimental group. (3) There is no significant difference between the pre-tests of the control and experimental group. (4) There is no significant difference between the post-tests of the control and experimental group.

2. METHODOLOGY

This study used descriptive-quasi experimental design using pre-test and post-test to the control and experimental group. This was conducted at Luna Central School, Poblacion, Luna, Apayao, school year 2022 – 2023.
The respondents of the study were the forty-eight (48) Grade V learners of Luna Central School. Twenty-four (24) learners were from the control group (section blue) and twenty-four (24) learners were from the experimental group (section pink). Total enumeration has been used because the enrollment in grade V blue and pink is relatively small.

This study used taragutog as an intervention for the multiplication skills of learners. The contents of the taragutog were adapted from the Department of Education Self-Learning Modules in Mathematics 5, quarter 2, module 7.

The data gathered were recorded, summarized, tabulated, analyzed, and interpreted. Mean, frequency and percentage was used to show the level of performance in the pre-test and post-test of the control and experimental group. Pearson – R was used to show the comparison of the pre-test and post-test of the control group, the pre-

test and post-test of the experimental group, the pre-tests of control and experimental group, the post-test of the control and experimental group.

The scale above was used to describe the level of performance of the control and experimental group in their pre-tests and post-tests. A score of 21 – 25 has an "Excellent" remark and a "High" descriptive value. A score of 16 – 20 has a "Very Good" remark and "Moderately High" descriptive value. A score of 11 – 15 has a "Good" remark and an "Average" descriptive value. A score of 6 – 10 has a "Fair" remark and "Moderately Low" descriptive value and a score of 0 – 5 has a "Poor" remark and a "Low" descriptive value.

Table 1. Respondents of the study

Group	Sections	Male	Female	Total
Control	Blue	13	11	24
Experimental	Pink	14	10	24
Total		**27**	**21**	**48**

Respondents

Table 2. Scale to analyze the data

Range of Scores	Remarks	Descriptive Value
21 – 25	Excellent	High
16 – 20	Very Good	Moderately High
11 – 15	Good	Average
6 – 10	Fair	Moderately Low
0 – 5	Poor	Low

Scale to describe the level of performance

3. RESULTS AND DISCUSSION

Table 3 presents the level of performance in the pre-test of the control group wherein the majority of participants (54.2%) demonstrated an average level of performance, with scores ranging from 11 to 15. A significant portion of participants (37.5%) achieved moderately low scores in the range of 6 to 10. No participants scored in the high or low ranges (21-25 and 0-5, respectively). The total mean score for the control group was 11.9167, with a standard deviation of 2.79622.

The distribution of performance levels in the pre-test of the control group suggests that a significant portion of participants exhibited an average to moderately low level of performance. This implies that the control group may require additional support or interventions to improve their skills and knowledge in the target area. The absence of participants scoring in the high range indicates a potential need for differentiated instruction or targeted interventions to enhance performance among higher-achieving individuals. These findings underscore the importance of analyzing and addressing the specific needs of the control group to ensure effective educational outcomes and tailor interventions accordingly.

The data shows that in the pre-test of the experimental group, the majority of participants (66.7%) demonstrated an average level of performance, with scores ranging from 11 to 15. A significant portion (33.3%) achieved moderately low scores in the range of 6 to 10. There were no participants in the high or low score ranges. The total mean score for the experimental group was 11.6250, with a standard deviation of 1.83712.

These findings indicate that similar to the control group, the experimental group also exhibited a distribution of performance levels centered around the average range. However, it is worth noting that the mean score for the experimental group (11.6250) was slightly higher than that of the control group (11.9167), while also having a lower standard deviation (1.83712 vs. 2.79622). This suggests that the experimental group may have shown a slightly higher overall performance level with less variability in scores compared to the control group.

The control group's post-test results indicate a significant performance improvement compared to the pre-test. In the post-test, the majority of participants (54.2%) achieved a moderately high level of performance, with scores ranging from 16 to 20. Additionally, 45.8% of the control group obtained high scores in the range of 21 to 25. There were no participants in the average, moderately low, or low score ranges.

These findings suggest that the traditional teaching approach employed in the control group resulted in notable progress and enhanced performance. The mean score of 20.2083 in the post-test, which is higher than the pre-test mean score of 11.9167, indicates a significant improvement in the control group's overall performance.

Table 3. Level of performance in the pre-test of the control group

Range of Scores	Descriptive Value	Frequency	Percentage
21-25	High	0	0
16-20	Moderately High	2	8.3
11-15	Average	13	54.2
6-10	Moderately Low	9	37.5
0-5	Low	0	0
Total		**24**	**100**

Total Mean Score = 11.9167; Std. Deviation = 2.79622

Table 4. Level of performance in the pre-test of the experimental group

Range of Scores	Descriptive Value	Frequency	Percentage
21-25	High	0	0
16-20	Moderately High	0	0
11-15	Average	16	66.7
6-10	Moderately Low	8	33.3
0-5	Low	0	0
Total		24	100

Total Mean Score = 11.6250; Std. Deviation 1.83712

Table 5. Level of performance in the post-test of the control group

Range of Scores	Descriptive Value	Frequency	Percentage
21-25	High	11	45.8
16-20	Moderately High	13	54.2
11-15	Average	0	0
6-10	Moderately Low	0	0
0-5	Low	0	0
Total		**24**	**100**

Total Mean Score = 20.2083; Std. Deviation = 2.24537

Table 6. Level of performance in the post-test of the experimental group

Range of Scores	Descriptive Value	Frequency	Percentage
21-25	High	17	70.8
16-20	Moderately High	7	29.2
11-15	Average	0	0
6-10	Moderately Low	0	0
0-5	Low	0	0
Total		**24**	**100**

Total Mean Score = 21.5417; Std. Deviation = 2.39527

The data from the experimental group's post-test indicates a significant performance improvement compared to the pre-test. The majority of participants (70.8%) achieved high scores in the range of 21 to 25, while 29.2% attained moderately high scores in the range of 16 to 20. No participants scored in the average, moderately low, or low ranges.

The findings suggest that the implementation of the taragutog approach in the experimental group resulted in substantial progress and enhanced performance. The mean score of 21.5417 in the post-test, which is higher than the pre-test mean score of 11.6250, demonstrates a significant improvement in the experimental group's overall performance.

It is important to note that the experimental group's superior performance in the post-test, characterized by a higher percentage of participants achieving high scores, indicates the potential effectiveness of the taragutog approach compared to the traditional teaching approach used in the control group.

Furthermore, the standard deviation of 2.39527 indicates a moderate level of variability in the scores among the experimental group participants. This suggests that while the majority of participants achieved high scores, there may be some variation in individual performance.

The results presented in Table 6. highlight the positive impact of the taragutog approach on the experimental group's post-test performance. A comparison between the control and experimental groups' post-test results would provide further insights into the relative effectiveness of the two teaching approaches.

The comparison of the pre-test and post-test scores of the control group reveals a substantial improvement in performance. The mean score increased significantly from 11.9167 in the pre-test to 20.2083 in the post-test. This improvement is accompanied by a lower standard deviation in the post-test (2.24537) compared to the pre-test (2.79622).

The statistical analysis conducted shows that the difference in means between the pre-test and post-test scores is statistically significant, as evidenced by the very low p-value of 0.000. Rejecting the null hypothesis (Ho) indicates that there is a significant difference between the pre-test and post-test scores in the control group.

Table 7. Comparison of the pre-test and post-test scores of the control group

	Mean	Std. Deviation	DF	P-value	Decision
Pre-test	11.9167	2.79622	23	0.000	Reject Ho
Post-test	20.2083	2.24537			

The observed improvement in the control group's performance implies that the traditional teaching approach employed in this study had a positive impact on the participants' learning outcomes. The significant increase in mean scores suggests that the teaching methods and interventions implemented during the study period effectively enhanced the participants' knowledge and skills in the target area.

These findings highlight the potential effectiveness of the traditional teaching approach in facilitating academic growth and achievement. Educators and policymakers can consider incorporating successful elements of the traditional teaching approach into instructional strategies and curriculum design to improve student performance.

Furthermore, the reduced standard deviation in the post-test scores indicates a decrease in performance variability among the control group participants. This suggests that the traditional teaching approach might have helped to narrow the performance gap within the group, leading to more consistent levels of achievement.

The table presents a comparison between the mean scores and standard deviations of the pre-test and post-test of the experimental group.

The pre-test mean score was 11.6250 with a standard deviation of 1.83712. The post-test mean score increased significantly to 21.5417, accompanied by a slightly higher standard deviation of 2.39527.

A hypothesis test was conducted to determine the statistical significance of the improvement. The obtained *P-value* was 0.000, indicating that the difference in means between the pre-test and post-test scores is statistically significant.

Based on the decision criteria, with a *P-value* less than 0.05, the null hypothesis (Ho) is rejected. This implies that there is a significant difference between the pre-test and post-test scores in the experimental group.

Overall, the results indicate a substantial improvement in the experimental group's performance from the pre-test to the post-test. The higher post-test mean score and slightly increased standard deviation suggest both an overall increase in performance and a slightly wider range of scores among participants.

The observed improvement in the experimental group's performance signifies the effectiveness of the taragutog intervention employed in this study. The significant increase in mean scores from the pre-test to the post-test indicates the positive impact of the taragutog approach on the participants' learning outcomes.

The findings suggest that incorporating taragutog into the instructional process can lead to significant knowledge and skill enhancement. This indicates the potential of game-based interventions, such as taragutog, in promoting engaging and effective learning experiences.

The table presents a comparison between the mean scores and standard deviations of the pre-test in the control and experimental groups. The control group had a pre-test mean score of 11.9167, with a standard deviation of 2.79622. The experimental group had a slightly lower pre-

test mean score of 11.6250, accompanied by a lower standard deviation of 1.83712. A hypothesis test was conducted to determine if there was a significant difference in the pre-test scores between the control and experimental groups. The obtained p-value was 0.643, which is greater than the significance level of 0.05.

Based on the decision criteria, with a *P-value* greater than 0.05, the null hypothesis (Ho) is accepted. This implies that there is no significant difference in the pre-test scores between the control and experimental groups.

Table 8. Comparison of the pre-test and post-test scores of the experimental group

	Mean	Std. Deviation	DF	P-value	Decision
Pre-test	11.6250	1.83712	23	0.000	Reject Ho
Post-test	21.5417	2.39527			

Table 9. Comparison of the pre-test scores of the control and experimental group

	Mean	Std. Deviation	DF	P-value	Decision
Pre-test (Control Group)	11.9167	2.79622	23	0.643	Accept Ho
Pre-test (Experimental Group)	11.6250	1.83712			

Overall, the results indicate that the control and experimental groups had similar pre-test scores, suggesting that they were comparable in terms of their baseline performance before the intervention. This similarity is supported by the non-significant *P-value*, indicating that any differences observed in the post-test scores are more likely to be attributed to the teaching approaches employed rather than pre-existing disparities in the groups.

The comparable pre-test scores between the control and experimental groups suggest that any observed differences in their post-test scores can be more confidently attributed to the teaching approaches employed. This strengthens the validity of the comparison and allows for a more reliable assessment of the effectiveness of the taragutug intervention in the experimental group.

Moreover, the similarity in pre-test scores indicates that the random assignment of participants to the control and experimental groups was effective in creating two groups that were initially similar in terms of their performance. This enhances the internal validity of the study and helps minimize potential confounding factors that could affect the results.

By comparing the post-test scores while controlling for similar pre-test scores, it becomes possible to more accurately evaluate the impact of the taragutug intervention in enhancing

learning outcomes. Further analysis and interpretation of the post-test results will provide a more comprehensive understanding of the relative effectiveness of the teaching approaches used in the control and experimental groups.

The table presents a comparison between the mean scores and standard deviations of the post-test in the control and experimental groups. The control group had a post-test mean score of 20.2083, with a standard deviation of 2.24537. The experimental group had a higher post-test mean score of 21.5417, accompanied by a slightly higher standard deviation of 2.39527.

A hypothesis test was conducted to determine if there was a significant difference in the post-test scores between the control and experimental groups. The obtained *P-value* was 0.048, which is less than the significance level of 0.05.

Based on the decision criteria, with a *P-value* less than 0.05, the null hypothesis (Ho) is rejected. This implies that there is a significant difference in the post-test scores between the control and experimental groups.

Overall, the results indicate that the experimental group achieved higher post-test scores compared to the control group. The rejection of the null hypothesis suggests that the difference observed in the post-test scores is statistically significant and likely attributable to the

implementation of the taragutog intervention in the experimental group.

The higher post-test scores in the experimental group compared to the control group suggest that the taragutog intervention had a positive impact on learning outcomes. The statistically significant difference in mean scores indicates that the use of taragutog facilitated greater knowledge and skill acquisition in the experimental group compared to the traditional teaching approach employed in the control group.

These findings support the notion that integrating game-based interventions, such as taragutog, can lead to enhanced learning outcomes. The use of interactive and engaging tools in education can contribute to increased student engagement, motivation, and overall performance.

The results from Table 10 provide evidence for the effectiveness of the taragutog intervention by demonstrating superior post-test scores in the experimental group. Further analysis can explore specific aspects of the intervention that contributed to the observed differences, helping inform future instructional practices and educational interventions.

It is important to note that while the difference in post-test scores is statistically significant, the practical significance and real-world implications of the findings should be considered in a broader context. Nonetheless, the rejection of the null hypothesis suggests that the taragutog intervention had a positive effect on the experimental group's post-test performance.

Table 10. Comparison of the post-test scores of the control and experimental group

	Mean	Std. Deviation	DF	P-value	Decision
Post-test (Control Group)	20.2083	2.24537	23	0.048	Reject Ho
Post-test (Experimental Group)	21.5417	2.39527			

4. CONCLUSION

In the pre-test, the control group exhibited a range of scores from 6 to 20, with the majority of participants falling into the "Average" and "Moderately Low" performance categories. The mean pre-test score for the control group was 11.9167, with a standard deviation of 2.79622. On the other hand, the experimental group had a similar distribution of scores in the pre-test, with a mean score of 11.6250 and a slightly lower standard deviation of 1.83712.

In the post-test, the control group showed a significant improvement, with a mean score of 20.2083 and a standard deviation of 2.24537. The experimental group, which employed the use of taragutog, exhibited even higher post-test scores, with a mean score of 21.5417 and a slightly higher standard deviation of 2.39527.

Statistical analysis revealed that the improvement in the control group's post-test scores was statistically significant, as evidenced by a *P-value* of 0.000. Similarly, the experimental group's post-test scores were significantly higher than the control group, with a p-value of 0.048.

These findings suggest that both the control and experimental groups demonstrated an increase in performance from the pre-test to the post-test. However, the experimental group, which utilized the taragutog intervention, exhibited a greater improvement in learning outcomes compared to the control group. This indicates the potential effectiveness of incorporating game-based interventions, like taragutog, in enhancing student performance.

It's important to note that the comparison of pre-test scores between the control and experimental groups showed no significant difference, indicating that the groups were comparable at the beginning of the study. This strengthens the validity of the comparison and supports the conclusion that the observed differences in post-test scores can be attributed to the teaching approaches employed.

Overall, these findings highlight the positive impact of the traditional teaching approach in the control group and the additional benefits of incorporating taragutog in the experimental group. Further research and analysis could provide deeper insights into the specific factors contributing to the observed improvements and inform instructional practices for future educational interventions.

The findings suggest that the use of taragutog, a game-based intervention, had a positive impact on learning outcomes compared to the traditional teaching approach employed in the control group.

The comparison of pre-test scores indicated that the control and experimental groups were initially similar in terms of their baseline performance. However, the post-test scores revealed a

significant improvement in both groups, with the experimental group achieving higher scores.

The control group demonstrated a notable improvement from the pre-test to the post-test, indicating the effectiveness of the traditional teaching approach. On the other hand, the experimental group, which utilized taragutog, exhibited even higher post-test scores, indicating the added benefits of this game-based intervention.

The statistically significant difference in post-test scores between the control and experimental groups further supports the effectiveness of the taragutog intervention. The higher scores in the experimental group suggest that the interactive and engaging nature of taragutog facilitated greater knowledge and skill acquisition.

These findings imply that incorporating game-based interventions, like taragutog, can enhance learning outcomes and promote student engagement and motivation. The results highlight the potential of gamification as a valuable tool in education and underscore the importance of innovative teaching approaches.

It is important to consider the limitations of the study, such as the small sample size and the specific context in which the study was conducted. Further research with larger sample sizes and in diverse educational settings would provide a more comprehensive understanding of the effectiveness of taragutog and its implications for teaching and learning.

Overall, the findings emphasize the potential benefits of incorporating taragutog to enhance learning outcomes, and they encourage educators to explore innovative approaches to engage students and promote effective learning.

This study recommends to:

1. Offer trainings to teachers on gamification strategies in teaching.
2. Offer ongoing professional development opportunities for educators to stay updated pedagogical approaches, enabling them to effectively integrate gamification into their teaching practices.
3. Continuously evaluate the effectiveness of gamified interventions.
4. Integrate taragutog in mathematics specially in the use of basic mathematical operations.
5. Have further studies on the effectiveness of taragutog in teaching mathematics is encouraged especially in Luna Central School.
6. Encourage further research on the use of gamification in different educational contexts.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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