



Utilization of the Effectiveness of the Bingo Game in Enhancing Performance in Differentiating Quadrilaterals

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ABSTRACT

A major concern in both locally (the Philippines) and globally is the low performance of students in mathematics. Hence, this study utilized the Bingo Game to enhance the performance of learners in differentiating quadrilaterals, which is the least learned competency of Grade 4 of School A. The study employed a quasi-experimental one-group pre-test and post-test design. Results showed that there was a statistically significant increase in students' scores on the test in differentiating quadrilaterals after receiving the intervention (bingo game). A Wilcoxon Signed-Rank Test indicated that the post-test ranks were statistically significantly higher than pre-test ranks, $Z = -3.466$, $p < .001$. This meant that the Bingo Game as an approach in teaching and learning was effective in improving the performance of the pupils in Differentiating Quadrilaterals, especially for Grade 4 pupils.

Keywords: differentiating quadrilaterals, least-learned competency, bingo game

INTRODUCTION

Learners' mathematics performance, both globally and locally, has been a major concern (Mabena et al., 2021). Learners generally do not perform well in mathematics (Mabena et al., 2021). Chavez (2025) stated, "Results of the mathematics performance of 15-year-old students in the Philippines are evidence of consistently underperforming compared to their peers in neighboring countries and on a global scale. It also indicates that students in the Philippines have not acquired the essential competencies in mathematics; hence, they are significantly behind international standards (Chavez, 2025).

The issues of poor achievement in Mathematics, especially at the primary schools, should bother all stakeholders, including parents and the government, specifically because Mathematics is at the heart of scientific and technological development (OGUNTANA et al., 2021). According to Gundaya (2023), the issue of poor Mathematics performance appears to be present at all levels of education. This is a major challenge that should be addressed by the teachers involved, as well as the Department of Education (Gundaya, 2023).

In schools throughout the world, Mathematics is regarded as the most significant subject (Gundaya, 2023). Unfortunately, because of the multiple barriers that keep them from fully participating, many students in the Philippines find it difficult (Gundaya, 2023).

The curriculum that is being used in the Philippines, especially in Grade 4, is the MATATAG Curriculum. According to DepEd (n.d.), the MATATAG Curriculum was launched on August 10, 2023. The MATATAG Curriculum Guides (CGs) for Kindergarten, Grades 1, 4, and 7, will be implemented starting SY 2024-2025 (DepEd, 2023). The MATATAG Curriculum represents a significant advancement in Philippine education, aiming to enhance literacy and numeracy outcomes among Filipino learners (Uy et al., 2024). Moreover, the MATATAG curriculum is a comprehensive educational framework designed to enhance learning and development in Philippine public schools, focusing on holistic, inclusive, and culturally relevant teaching practices incorporated into peace and values education and reading enhancement (Aquino E., 2024).

The MATATAG Curriculum Mathematics Grade 4 is composed of 3 content domains. These are the Measurement and Geometry (MG), Number and Algebra (NA), and Data and Probability (DP). According to the Department of Education (2023), the mathematics curriculum focuses on learners in Grades 4 to 6. At this stage, the curriculum extends to numbers, algebra, measures, geometry, data, and probability.

Due to the researcher's desire to gather initial data that will be the basis for his research, He found out that one of the competencies in number and geometry is one of the least learned by the students based on the item analysis of the teacher of School A, and that is differentiating quadrilaterals. This is where the study will be carried out.

Geometry is one of the required mathematics courses for students at every educational level (Putri et al., 2025). The study of geometry is part of the mathematics curriculum and is considered by teachers, students, and parents alike as one of the most important study areas in school (Nahmias & Teicher, n.d.).

Game-based learning (GBL) can allow learners to acquire and construct knowledge in a fun and focused learning atmosphere (Pan et al., 2021). One of example of game-based learning is the Bingo Game.

The bingo game is widely used today in different disciplines. In education, it is used as an intervention in Vocabulary, and the result is that the Bingo game can improve students' vocabulary mastery, and the Bingo game can be recommended as one of the great strategies in teaching vocabulary to students (Noviyanti et al., 2019). In Mathematics, according to Tella, A., & Fatoki, F. M. (2021), the bingo game instructional strategy improved pupils' achievement in mathematics. Primary school mathematics teachers should try to adopt this strategy in their teaching delivery (Tella, A., & Fatoki, F. M., 2021).

According to Raihan, F. D. (2021), stated "Bingo Games", this game is inspired by a card game containing numbers with the same name, namely the bingo game, created by Edwin S. Lowe after he heard someone accidentally shout "bingo". This game originally used a 5x5 numerical grid card. However, a core challenge in geometry education, particularly in School A, is that students often struggle to differentiate quadrilaterals. Instead of using the 5x5 numerical grid card, the researcher modified it and made it a 3x3 shape grid card. The full details for this modified bingo game are detailed in Chapter II (Methodology).

There are no studies in Biliran Province and even at the national level about the bingo game as an intervention to improve student performance in differentiating quadrilaterals, which is why the researcher pursues this research.

METHODOLOGY

Research Design

The study employed a quasi-experimental one-group pre-test and post-test design. This design involves administering a pretest to below mastery students, implementing an intervention, and then administering a posttest to determine the impact of the intervention on student performance. The pretest-posttest design helps determine whether the Bingo Game enhances student performance in differentiating quadrilaterals.

Research Locale

The study will be conducted at School A, a public school located in Bunga, Cabucgayan, Biliran. The recent periodical test results show that the least learned competencies in Grade 4 Mathematics is in geometry and that is differentiating quadrilaterals.

Research Respondents

The research respondents of this study are the 32 identified grade 4 learners, with the help of the item analysis of the grade 4 subject teacher in School A. Based on the pre-test, the mastery of the learners in the competency differentiating quadrilaterals is 2 learners got 10 score, 4 learners got 9 score and 5 learners got 8 which is interpreted as Nearly Proficient, 3 learners got 7 score, 7 learners got 6 score, 5 learners got 5 score and 3 learners got 4 score which is interpreted Low Proficient, and 1 learners got 3 score, 2 learner got 2 score in the competency which is interpreted as Not Proficient.

Research Instruments

The primary instructional instrument used in the experimental intervention was a modified version of the traditional Bingo game. The design was purposefully altered from the standard format to align with the specific learning objective, which is differentiating quadrilaterals.

Modification of the Grid: The conventional 5x5 Bingo grid was adapted to a 3x3 matrix. This reduction resulted in nine possible elements per card, a modification implemented to better suit the specific number of quadrilateral types (square, rectangle, trapezoid, parallelogram, and rhombus) covered in the curriculum and to ensure the game could be completed effectively within the lesson period. Four distractors are also being used (cross, right triangle, arrow, and torus).

Modification of the Content: Instead of letters and numbers, the cells of the 3x3 cards contained high-resolution images of common quadrilaterals (e.g., square, rectangle, rhombus, trapezoid, parallelogram), and four distractors are also being used (cross, right triangle, arrow, and torus). The game was played by allowing the student to draw the Bingo Roller cage, and they will read what shape was being drawn, and the student would mark an X on the bingo card. First player to mark 3 correct shapes in a row (horizontal, vertical, or diagonal) shouts "BINGO!" and wins. While playing Bingo Game, the teacher asks questions that make students differentiating quadrilaterals.

Purpose: This modified game served as the core instructional intervention for the respondents to assess the effect of the Bingo Game on Differentiating Quadrilaterals.

This study also utilized pre-test and post-test among the thirty-two identified least learned learners in Grade 4 School A. The pre-test and post-test contain the same set of questions and a 15-item test about differentiating quadrilaterals, and were taken from the teacher. Additionally, the Assessment Scale provided in DepEd Order No. 24, s. 2022 is being used to interpret the score. 14-15 is interpreted as Highly Proficient, 12-13 are interpreted as Proficient, 8-11 are interpreted as Nearly Proficient, 5-7 are interpreted as Low Proficient, and 0-4 are interpreted as Not Proficient.

Data Gathering Procedure

Before the gathering of data, the researcher writes a letter requesting permission from the Principal of School A to conduct the study. To ensure the support and cooperation, an explanation was provided to the principal and teachers of the school to make things clear and to thresh out from being skepticism. For full implementation of the study, the researcher asked the Grade 4 teacher of School A about the least learned competency in mathematics and then the researcher identified the learners who got low performance. A pre-test was given. Secondly, the researcher validates the pre-test (revised) found in Appendix C and the results are found in Appendix D. Thirdly, the researcher conducts a lesson in differentiating quadrilaterals using the Bingo Game. Lastly, a post-test was given to the pupils to determine if the intervention (Bingo Game) improves student performance in Differentiating Quadrilaterals. The data gathering was programmed for 4 weeks and 5 days, and was personally done by the researcher.

Data Scoring

The pre-test and post-test performance of the learners are being evaluated with the Assessment Scale provided in DepEd Order No. 24, s. 2022 titled Adoption of the Basic Education Development Plan 2030.

Table 1 - Assessment Scale (DepEd Order No. 24, s. 2022)

Levels of Proficiency	Mean Percentage Score	Equivalent Score
Highly Proficient	90-100	13.5-15
Proficient	75-89	11.25-13.35
Nearly Proficient	50-74	7.5-11.11
Low Proficient	25-49	3.7-7.35
Not Proficient	0-24	0-3.6

Statistical Treatment of Data

Data in this study were analyzed and interpreted using the following:

Descriptive Statistics, such as mean, standard deviation, and standard error, were used to describe the significant difference between pre-test and post-test scores.

The data analysis technique is through the Wilcoxon Signed Ranks Test, since the pre-test data is not normally distributed, to see whether or not the Bingo Game improves the students' performance in differentiating quadrilaterals.

RESULTS AND DISCUSSION

In this section, the results of the study are presented and discussed with reference to the aim of the study, which was to determine the difference between the pre-test and post-test scores of the learners after the intervention was applied to know whether it was effective or not in improving learner's performance in differentiating quadrilaterals.

Learners' Performance in Differentiating Quadrilaterals

The table below shows the descriptive results of the learner's performance in differentiating quadrilaterals.

Table 2 - Descriptive Results of the Learners' Performance in Differentiating Quadrilaterals

Test	Mean	Standard Deviation	Standard Error	Interpretation of Assessment Scale
Pre-Test	6.143	2.171	0.367	Low Proficient
Post-Test	7.743	2.318	0.392	Nearly Proficient

Table 2 presents Means, Standard deviations, Standard Errors, and the Interpretation of the Assessment Scale of the student scores on the pretest and post-test scores.

As shown in Table 2, grade 4 pupils have a mean score of 6.143 with a standard deviation of 2.171, a standard error of 0.367, and it is interpreted as Low Proficient in Interpretation of Assessment Scale in their pre-test, which was reflected in the score they got in the 15-item test.

From the same table, grade 4 pupils have a mean score of 7.743 with a standard deviation of 2.318, a standard error of 0.392, and it is interpreted as Nearly Proficient in their post-test, which was reflected in the score they got in the 15-item test.

Results showed that there was a statistically significant increase in students' scores on the test in differentiating quadrilaterals after receiving the intervention. It has been seen that the given results have made a positive impact on the performance of the students in utilizing the Bingo Game.

This is in accordance with the findings of Tella, A., & Fatoki, F. M. (2021), that the bingo game instructional strategy improved pupils' achievement in mathematics.

Significant Difference between Pretest and Posttest Scores

The table below shows the significant differences between the pretest and posttest scores of the learners' performance in Differentiating Quadrilaterals.

Table 3 - Test Statistic Table for the Pre-test & Post-test of Learners' Performance in Differentiating Quadrilaterals

	Post-test - Pre- test
Z	-3.466
Asymp. Sig. (2-tailed)	< .001

**Significant at a p-value < .05*

A Wilcoxon Signed-Rank Test indicated that the post-test ranks were statistically significantly higher than pre-test ranks, $Z = -3.466$, $p < .001$. This meant that the Bingo Game as an approach in teaching and learning was effective in improving the performance of the pupils in Differentiating Quadrilaterals, especially for Grade 4 pupils.

Based on the performance of the learners and their scores from the post-test given it shows that it is higher compared to the result of their pre-test. This result also shows that the Bingo Game aroused learners' interest in learning mathematics. In the study of Oguntana et al. (2021), the bingo game is effective in the teaching and learning of Mathematics. This implies that the Bingo Game influences the performance of learners.

4. CONCLUSION AND RECOMMENDATION

This chapter presents the conclusions drawn from the results and the recommendations of the researchers for improvements and further study.

Conclusion

The study aimed to improve the Learners' Performance in Differentiating Quadrilaterals using a Bingo Game and to evaluate the effectiveness of the Bingo Game in enhancing the performance of Differentiating Quadrilaterals among the Grade 4 learners of School A. The result shows that there is a significant difference between the grade 4 pupils' pre-test scores and the post-test scores, and that the post-test scores had significantly increased after the implementation of the Bingo Game as an intervention. Therefore, based on the results, it is concluded that the Bingo Game as an approach in teaching is effective in improving the performance of the pupils in differentiating quadrilaterals, especially for Grade 4 learners.

Recommendations

Based on the conclusion drawn from the study, the following recommendations are hereby offered for consideration.

1. Considering the learners' problem in writing the correct spelling of quadrilaterals during the intervention, it suggests that the teacher should give learners more practice in writing the correct spelling of quadrilaterals.
2. The teacher should explain the rules of the Bingo Game clearly before the game starts and repeat them at least three times to make it clear for the students and avoid misunderstanding the rules.
3. The school administrators are encouraged to provide facilities, tools, and materials to support the students in making a better Bingo Game.
4. This study focuses on the utilization of the Bingo Game in enhancing the performance in differentiating quadrilaterals. The replication of the study in a mixed-method or two-group experimental design is encouraged for further confirmation and wider results.
5. Bingo Game was used in this study to enhance the learning performance of the learners. Other researchers can apply this game to other subjects or fields.

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