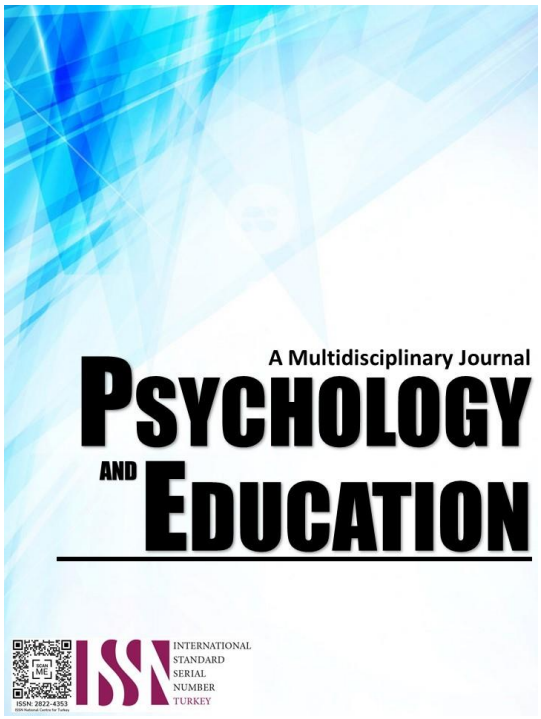
LITERACY AND NUMERACY SKILLS OF GRADE IV PUPILS OF SANTA CRUZ NORTH CENTRAL SCHOOL USING GAME-BASED LEARNING (GBL) TOWARDS ENHANCED LEARNING PLAN



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Research Article

Literacy and Numeracy Skills of Grade IV Pupils of Santa Cruz North Central School Using Game-Based Learning (GBL) Towards Enhanced Learning Plan

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Abstract

This study aimed to determine the changes in the performance of Grade 4 pupils of Santa Cruz North Central School in the literacy and numeracy using the Game-Based Learning (GBL) strategy. The researcher used a pre-experimental research design of which participants are the 46 Grade 4 learners. The instrument used were the researcher-made pretest and posttest validated by the experts. Descriptive statistics were utilized for the study. The result of the pretest and posttest before and after the utilization of GBL indicated high gain. Literacy skills increased by three levels, from Low Proficiency level to Proficient level while Numeracy skills increased by four levels, from Low proficiency level to Highly proficient level. These findings showed that GBL evidently improves the literacy and numeracy skills of Grade 4 learners. In conclusion, GBL is an effective tool for enhancing academic performance and skill development. It provides an engaging and interactive learning experience that positively impacts students' literacy and numeracy abilities. Moreover, teachers can enhance the learning plan and maximize the benefits of GBL in developing the literacy and numeracy skills of Grade 4 learners. The research recommends exploring the effectiveness of GBL in different educational contexts and age groups.

Keywords: *literacy, numeracy, game-based learning, learning plan*

Introduction

The Philippines' Department of Education believes that children with reading and numeracy abilities are more likely to continue their education full-time and, as adults, are more likely to be productive and generate more revenue. According to DepEd Order 12, S. 2015 as per bullet number one that in line with the President's Ten Point Basic Education Agenda which states that "every child should be a reader by Grade 1," the Department of Education (DepEd) is strengthening its reading program through the implementation of the Early Language, Literacy, and Numeracy Program. Additionally, enhancing pupils' literacy and numeracy can improve their self-confidence, capacity to handle daily chores, and academic performance. During their years in primary school, students' literacy and numeracy abilities could be improved.

In addition to what World Literacy Foundation Chief Executive Officer and co-author of the report Andrew Kay mentioned, "early data shows a drop in literacy rates post-pandemic," justifying the need for urgent literacy programs. As for the School Excellence Framework (SEF) states that 'all teachers understand and explicitly teach literacy and numeracy to students at all levels of achievement, in all subject areas, with success that can be measured by improved student progress and achievement data'. Therefore, it is clear that elementary school teachers have essential roles and duties in ensuring their kids are adequately equipped with these skills. Since 21st-century learners randomly use technology to keep them engaged in learning, as found in the study of Joynes et al. (2019), using games as instructional resources can be considered an important aspect to integrate into teaching. Students of this generation have grown up in the digital age, according to Prensky (2021), who mentioned this fact in his book on game-based learning. Digital natives are the term used to describe today's youth. It indicates that they have grown up with much exposure to digital technologies. The term "technology-aided learning, serves as a catch-all for the plethora of educational technologies (Gazzaley, 2016).

According to Trybus (2015), to engage users, game-based learning borrows specific gaming ideas and applies this to actual contexts. Students Thanks to the motivating psychology incorporated into game-based learning, students can interact with instructional materials playfully and engagingly learning activities that can gradually introduce concepts and lead users toward a goal is what game-based learning means. It goes beyond simply making games for students to play. Traditional games can include rivalry, rewards, points, and feedback loops. In order to get students interested in learning, these ideas are becoming more and more common in higher education and libraries.Hence, these studies reveal that games have various beneficial effects on pupils' literacy and numeracy development. By encouraging abilities like understanding causality, logic, and decision-making that they can use outside of the classroom, game-based learning can assist students in finding solutions to

problems. According to research entitled Using Game based Learning to Foster Critical Thinking in Student Discourse 2015, GBL can help students' critical thinking abilities by giving them opportunities for guided reflection and helping them form their own opinions before participating in group discussions. In an article entitled Foundations of Game-Based Learning 2015 it was mentioned that a motivational approach to game-based learning emphasizes that games are able to engage and motivate players by providing experiences that they enjoy and want to continue. Gamification and game-based learning are considered useful tools to increase student engagement and motivation (Chang & Wei, 2016). A motivational approach to game-based learning emphasizes that games are able to engage and motivate players by providing experiences that they enjoy and want to continue. Learning is a fundamentally social process that takes place outside of our heads.

The Philippines' K–12 curriculum includes contextualization and localization, spiral progression, and 21st-century skills, among other essential components. In addition, 21st-century learners are exposed to a wide range of print and non-print materials that allow them to develop into functionally literate, technologically savvy people and lifelong learners. With this, it is imperative to use GBL in instruction. In the Schools Division of Marinduque, game-based learning is primarily used with traditional games; however, the prevalence of games has yet to be fully explored. In addition, though teachers were encouraged to facilitate games in the classroom to enable students to interact with lessons through application to real-world circumstances, the use of GBL in instruction still needs to be fully implemented. Like reading, facilitating games in the classroom allows students to engage in teachings through real-world scenarios and gives teachers an engaging outlet for non-traditional learning. According to Mitgutsch (2007, cited in Chandler, 2013), using games to augment instruction can be effective if teachers keep in mind that playing the game with others is what results in learning.

The application of GBL in instruction, however, is exceedingly unlikely to ensure learning gains over time because the dynamics of GBL are independent of gameplay alone. The learning environment may be safe if reliable learning strategies support GBL. The absence of teacher training in instructional technology outside of PowerPoint usage is a factor in the District of Santa Cruz North. Teaching strategies still need to be more conventional and unimaginative.On this premise, the study was put forward to integrate the GBL in the instruction of enhancing the literacy and numeracy skills of the Grade 4 learners of Santa Cruz North Central School to enhance the teachers' learning plan.

Research Questions

This study aimed to integrate the GBL in the instruction of enhancing the literacy and numeracy skills of the Grade 4 learners of Santa Cruz North Central School to develop an enhanced learning plan for Grade 4 teachers for literacy and numeracy. Specifically, it sought answers to the following questions;

1. What is the level of literacy and numeracy skills of the Grade 4 pupils before and after using the Game-Based Learning based on the mean scores of the pretest and posttest?
2. What are the changes in the level of literacy and numeracy skills of the Grade 4 pupils after using Game-Based Learning?
3. What is the implication of using Game-Based Learning in the literacy and numeracy skills of the Grade 4 learners of Santa Cruz North Central School?

Methodology

Research Design

In this study, a pre-experimental research design was used. The research design included one or more experimental groups observed about particular treatments. This was the most straightforward research strategy because it mimicked the fundamental procedures of experiments. In addition, there was no control group in the pre-experimental design. Therefore, even though the researcher may have said that individuals who received a specific therapy changed, they could not conclude that the treatment brought on the change. This research design was suited to the study since it employed game-based learning as an intervention strategy to enhance the literacy and numeracy skills of the target participants.

Research Locale

This study was conducted in the province of Marinduque, one of the 81 provinces in the Philippine and is considered the Archipelago’s geographic center. It is a heart-shaped island province in the

MIMAROPA region, is often called the "Heart of the Philippines", that nestles between the Bondoc Peninsula at the south-eastern part of Luzon and the island of Mindoro. It is bounded by four bodies of water, on the north by Tayabas Bay, northeast by Mongpong Pass, South-east by Tayabas Strait, and Sibuyan at the south. The province consists of six municipalities, namely Boac, Buenavista, Gasan, Mogpog, and Sta. Cruz, and Torrijos. Its capital is the municipality of Boac. There is one School's Division in Marinduque in which consists of nine districts; Boac North, Boac South, Buenavista, Gasan, Mogpog, Sta. Cruz North, Sta. Cruz East, Sta. Cruz South and Torrijos. The study pertains in one of the schools under the Sta. Cruz North District which is Sta. Cruz North Central School in the participation of the Grade 4 students in the said school.

Research Instrument

The researcher utilized the following data gathering instruments: (1) Weekly Lesson Plan; and (2) Teacher-Made Pretest and Posttest.

Weekly Lesson Plan. The weekly lesson plan was used to ensure that the GBL strategies were applied in the class. There was no actual weekly lesson plan format for teaching the GBL strategies, but it was integrated and substituted as part of the weekly lesson plan procedures. Using a weekly lesson plan format, the skills were integrated using the Game-Based Learning strategy. Two sets of weekly lesson plans were used in this research, five for English and five for Mathematics.

Teacher-Made Pretest and Posttest. The teacher-made pretest and posttest were used to measure the learners' abilities. To develop this, the following steps were done:

Construction: The researcher created a pretest and post-test with 5 items for each competency in literacy and the same number of items for numeracy. These exams were connected with the core assessment of the school to plan all the questions that would gauge the learners' performance in the language and math courses.

Content: The topics from the MELC for English and Mathematics at the Grade 4 level were used as the basis in the researcher-made pretest and posttest. Learners could show their literacy and numerical skills in the topics presented.

English and Math subjects were used as the basis for measuring literacy and numeracy levels in this study because these subjects are considered foundational skills essential for academic success and daily living.Furthermore, English and Math skills are often integrated into other academic subjects and are necessary for students to fully engage with and comprehend those subjects. For example, a student's ability to read and understand a science textbook or a math word problem can significantly impact their academic success.

Ethical Considerations of the Study

The participants' voluntary participation in the study was taken into account. The consent of their parents was requested as they were still regarded as minors. Furthermore, the parents of the students received a briefing that explained their right to ask for their child to be removed from the study. The participants were also given sufficient information and guarantees regarding their participation, allowing them to fully understand the implications of their involvement and make an independent decision to participate without any pressure or coercion. To safeguard the privacy of the data, offensive, discriminatory, and unwanted items were ignored in the questionnaire by the researcher. In addition, each respondent was coded and numbered instead of using their name to preserve anonymity. The study adhered to the APA reference style described in the bibliography section to correctly credit other authors' works. Throughout the project, debates and analyses were conducted with the utmost neutrality. In compliance with the Data Privacy Act or Republic Act No. 10173, which aims to protect all kinds of private, personal, or sensitive information, the study followed the appropriate guidelines.

Results and Discussion

Level of Literacy and Numeracy Skills of the Grade 4 Pupils Before and After Using the Game-Based Learning

Table 1.1 provides an overview of the level of literacy skills of the participants based on the pretest and posttest scores for various learning competencies. The first learning competency focuses on using adverbs (adverbs of manner, place, and time) in sentences. The pretest score for this competency was 43%, indicating a low proficiency level. However, the posttest score showed significant improvement at 93%, corresponding to a highly proficient level. The gain or mean difference between the pretest and posttest scores was 50%.

Table 1.1. *Level of Literacy skills based on the Pretest and Posttest*

Learning Competencies	*Average Mean Percentage Score Pretest*	*Level*	*Average Mean Percentage Score Posttest*	*Level*	*Gain/ Mean Difference*
1.Use adverbs (adverbs of manner, place and time) in sentences. EN4G-IIIe-16	43%	Low Proficiency	93%	Highly Proficient	50%
2.Distinguish between general and specific statements	40%	Low Proficiency	87%	Proficient	37%
3.Identify the main idea, key sentences, and supporting details from text listened to EN4LC-IIIg-1.1	39%	Low Proficiency	84%	Proficient	45%
4.Infer the speaker's tone, mood and purpose.	42%	Low Proficiency	92%	Highly Proficient	50%
5.Analyze a story in terms of its elements. EN4RC-Ib-2.1.1	39%	Low Proficiency	90%	Highly Proficient	51%
Average	41%	Low Proficiency	89%	Proficient	48%

Legend:
90 - 100 Highly Proficient
75 - 89 Proficient
50 -74 Nearly Proficient
25 - 49 Low Proficiency
0 - 24 Nor Proficient

Moving on to the second learning competency, it involves distinguishing between general and specific statements. The pretest score for this competency was 40%, indicating a low proficiency level. However, the posttest score improved to 87%, corresponding to a proficient level. The gain or mean difference between the pretest and posttest scores was 37%.

The third learning competency focuses on identifying the main idea, key sentences, and supporting details from text listened to. The pretest score for this competency was 39%, indicating a low proficiency level. However, the posttest score improved to 84%, corresponding to a proficient level. The gain or mean difference between the pretest and posttest scores was 45%.

The fourth learning competency involves inferring the speaker's tone, mood, and purpose. The pretest score for this competency was 42%, indicating a low proficiency level. However, the posttest score showed significant improvement at 92%, corresponding to a highly proficient level. The gain or mean difference between the pretest and posttest scores was 50%.

Lastly, the fifth learning competency focuses on analyzing a story in terms of its elements. The pretest score for this competency was 39%, indicating a low proficiency level. However, the posttest score improved to 90%, corresponding to a highly proficient level. The gain or mean difference between the pretest and posttest scores was 51%.

Overall, the average mean percentage score for the pretest was 41%, indicating a low proficiency level. However, the average mean percentage score for the posttest showed improvement to 89%, corresponding to a proficient level. The average gain or mean difference between the pretest and posttest scores was 48%.

This finding is related to the study by Lesaux et al. (2017), who investigated the gains in vocabulary and reading comprehension skills of English language learners after participating in a vocabulary intervention program.

Table 1.2. *Level of Numeracy skills based on the Pretest and Posttest*

Learning Competencies	*Average Mean Percentage Score Pretest*	*Level*	*Average Mean Percentage Score Posttest*	*Level*	*Gain/ Mean Difference*
1.Identifies and describes triangles according to sides and angles. M4GE-IIIe-16	43%	Low Proficiency	94%	Highly Proficient	51%
2.Identifies and describes the different kinds of quadrilaterals: square, rectangle, parallelogram, trapezoid, and rhombus. M4GE-IIIe-17	41%	Low Proficiency	95%	Highly Proficient	54%
3.Determines the missing term/s in a sequence of numbers (e.g., odd numbers, even numbers, multiples of a number, factors of a number, etc.) M4AL-IIIe-5	40%	Low Proficiency	88%	Proficient	48%
4.Visualizes the perimeter of any given plane figure in different situations. M4ME-IIIg-48	40%	Low Proficiency	90%	Highly Proficient	50%
5.Finds the perimeter of triangles, squares, rectangles, parallelograms, and trapezoids. M4ME-IIIi-51	39%	Low Proficiency	87%	Proficient	48%
Average	40%	Low Proficiency	91%	Proficient	51%

Legend: 90 - 100 Highly Proficient
75 - 89 Proficient
50 -74 Nearly Proficient
25 - 49 Low Proficiency
0 - 24 Nor Proficient

Table 1.2 provides an overview of the level of numeracy skills of the participants based on the pretest and posttest scores for the numeracy learning competencies. The first learning competency focuses on identifying and describing triangles according to sides and angles. The pretest score for this competency was 43%, indicating a low proficiency level. However, the posttest score significantly improved to 94%, corresponding to a highly proficient level. The gain or mean difference between the pretest and posttest scores was 51%.

Moving on to the second learning competency, it involves identifying and describing different kinds of quadrilaterals such as squares, rectangles, parallelograms, trapezoids, and rhombuses. The pretest score for this competency was 41%, indicating a low proficiency level. However, the posttest score showed significant improvement at 95%, corresponding to a

highly proficient level. The gain or mean difference between the pretest and posttest scores was 54%.

The third learning competency focuses on determining missing terms in number sequences (e.g., odd numbers, even numbers, multiples of a number, factors of a number, etc.). The pretest score for this competency was 40%, indicating a low proficiency level. However, the posttest score improved to 88%, corresponding to a proficient level. The gain or mean difference between the pretest and posttest scores was 48%.

The fourth learning competency involves visualizing the perimeter of any given plane figure in different situations. The pretest score for this competency was 40%, indicating a low proficiency level. However, the posttest score improved to 90%, corresponding to a highly proficient level. The gain or mean difference between the pretest and posttest scores was 50%.

Lastly, the fifth learning competency focuses on finding the perimeter of triangles, squares, rectangles, parallelograms, and trapezoids. The pretest score for this competency was 39%, indicating a low proficiency level. The posttest score improved to 87%, corresponding to a proficient level. The gain or mean difference between the pretest and posttest scores was 48%.

Overall, the average mean percentage score for the pretest was 40%, indicating a low proficiency level. However, the average mean percentage score for the posttest significantly improved to 91%, corresponding to a proficient level. The average gain or mean difference between the pretest and posttest scores was 51%.

The results indicate that the strategy effectively enhanced students' numeracy skills across various learning competencies, facilitating their transition from low proficiency to highly proficient or proficient levels. The observable gains achieved highlight the success of the intervention in promoting students' understanding and application of numeracy concepts, emphasizing the importance of tailored interventions to support and improve students' numeracy abilities.

The findings of this study are aligned with the study by Riccomini et al. (2015), which explored the effectiveness of a targeted intervention approach for improving students' number sense skills, showcasing the benefits of personalized instruction.

The Changes in the Level of Literacy and Numeracy Skills of Grade 4 pupils before and after using Gamed-Based Learning (GBL)

Table 2.1. *Changes in the Level of Literacy Skills based on English Learning Competency 1 (Use adverbs (adverbs of manner, place and time) in sentence. EN4G-IIIe-16)*

	Frequency	*Percent*
Nearly Proficient - Highly Proficient	14	30.4
Proficient - Highly Proficient	11	23.9
Nor Proficient – Proficient	7	15.2
Low Proficiency – Proficient	7	15.2
Nor Proficient - Highly Proficient	4	8.7
Nearly Proficient – Proficient	3	6.5
Total	46	100.0

Legend:

90 - 100	*Highly Proficient*
75 - 89	*Proficient*
50 -74	*Nearly Proficient*
25 - 49	*Low Proficiency*
0 - 24	*Nor Proficient*

Table 2.1 presents the results of pretest and posttest for the level of Literacy Skills in competency 1 among a group of 46 individuals. The participants were evaluated on a scale ranging from "Nor Proficient" to "Highly Proficient", with additional categories of "Proficient"," Nearly Proficient " and “Low Proficiency” in between.

The results show that 30.4% of the participants achieved a level of competency that was rated as "Nearly Proficient to Highly Proficient ". 23.9% of the participants achieved a level of competency that was rated as " Proficient to Highly Proficient ". 15.2% of the participants achieved a level of competency that was rated as " Nor Proficient to Proficient ". Another 15.2% of the participants achieved a level of competency that was rated as " Low Proficiency to Proficient ". Only 8.7% of the participants achieved a level of competency that was rated as " Nor Proficient to Highly Proficient ". Finally, 6.5% of the participants achieved a level of competency that was rated as " Nearly Proficient to Proficient ".Overall, the results indicate that the majority of the participants achieved a Highly Proficient or better level of Literacy skills in English competency 1. However, there is still room for improvement, as a significant proportion of the participants were rated as "Nor Proficient to Highly Proficient".

Table 2.2. *Changes in the Level of Literacy Skills based on English Learning Competency 2 (Distinguish between general and specific statements)*

	Frequency	Percent
Low Proficiency – Proficient	18	39.1
Low Proficiency – Highly Proficient	11	23.9
Nor Proficient – Proficient	8	17.4
Nearly Proficient – Highly Proficient	6	13.0
Nearly Proficient – Proficient	3	6.5
Total	46	100.0

Legend:

90 - 100	*Highly Proficient*
75 - 89	*Proficient*
50 -74	*Nearly Proficient*
25 - 49	*Low Proficiency*
0 - 24	*Nor Proficient*

Table 2.2 presents the results of pretest and posttest for the level of Literacy Skills in English competency 2 among a group of 46 individuals. The participants were evaluated on a scale ranging from "Nor Proficient" to "Highly Proficient", with additional categories of "Proficient"," Nearly Proficient " and “Low Proficiency” in between.

The results show that 39.1% of the participants achieved a level of competency that was rated as " Low Proficiency to Proficient ". 23.9% of the participants achieved a level of competency that was rated as " Low Proficiency to Highly Proficient ". 17.4% of the participants achieved a level of competency that was rated as " Nor Proficient to Proficient ". 13.0% of the participants achieved a level of competency that was rated as " Nearly Proficient to Highly Proficient ". Finally, 6.5% of the participants achieved a level of competency that was rated as " Nearly Proficient to Proficient ".

Overall, the results indicate that the majority of the participants achieved a Proficient level of English competency 2, with a relatively high percentage of participants achieving a rating of "Low Proficiency to Proficient".

Table 2.3 presents the results of pretest and posttest for the level of Literacy Skills in English competency 3 among a group of 46 individuals. The participants were evaluated on a scale ranging from "Nor Proficient" to "Highly Proficient", with additional categories of "Low Proficiency" and "Nearly Proficient" in between.

Table 2.3. *Changes in the Level of Literacy Skills based on English Learning Competency 3*

(Identify the main idea, key sentences, and supporting details from text listened to.)

	Frequency	*Percent*
Low Proficiency – Proficient	21	45.7
Nor Proficient – Proficient	9	19.6
Low Proficiency – Highly Proficient	8	17.4
Nearly Proficient – Proficient	7	15.2
Nearly Proficient – Highly Proficient	1	2.2
Total	46	100.0

Legend:

90 - 100	*Highly Proficient*
75 - 89	*Proficient*
50 -74	*Nearly Proficient*
25 - 49	*Low Proficiency*
0 - 24	*Nor Proficient*

The results show that 45.7% of the participants achieved a level of competency that was rated as " Low Proficiency to Proficient ". 19.6% of the participants achieved a level of competency that was rated as " Nor Proficient to Proficient ". 17.4% of the participants achieved a level of competency that was rated as " Low Proficiency – Highly Proficient ". 15.2% of the participants achieved a level of competency that was rated as "Nearly Proficient to Proficient ". Finally, 2.2% of the participants achieved a level of competency that was rated as " Nearly Proficient to Highly Proficient ".

Overall, the results indicate that the majority of the participants achieved a Proficient level of English competency 3, with a relatively high percentage of participants achieving a rating of "Low Proficiency to Proficient".

Table 2.4. *Changes in the Level of Literacy Skills based on English Learning Competency 4 (Infer the speaker’s tone, mood and purpose.)*

	Frequency	*Percent*
Low Proficiency – Highly Proficient	21	45.7
Low Proficiency – Proficient	13	28.3
Nearly Proficient – Highly Proficient	6	13.0
Nor Proficient – Proficient	3	6.5
Nearly Proficient – Proficient	3	6.5
Total	46	100.0

Legend:

90 - 100	*Highly Proficient*
75 - 89	*Proficient*
50 -74	*Nearly Proficient*
25 - 49	*Low Proficiency*
0 - 24	*Nor Proficient*

Table 2.4 presents the results of pretest and posttest for the level of Literacy Skills in English competency 4 among a group of 46 individuals. The participants

were evaluated on a scale ranging from "Nor Proficient" to "Highly Proficient", with additional categories of "Low Proficiency" and "Nearly Proficient" in between.

The results show that 45.7% of the participants achieved a level of competency that was rated as "Low Proficiency to Highly Proficient". 28.3% of the participants achieved a level of competency that was rated as "Low Proficiency to Proficient". 13.0% of the participants achieved a level of competency that was rated as "Nearly Proficient to Highly Proficient". 6.5% of the participants achieved a level of competency that was rated as " Nor Proficient to Proficient ". Finally, 6.5% of the participants achieved a level of competency that was rated as "Nearly Proficient – Proficient".

Overall, the results indicate that the majority of the participants achieved a Highly Proficient level of English competency 4, with a relatively high percentage of participants achieving a rating of "Low Proficiency to Highly Proficient".

Table 2.5. *Changes in the Level of Literacy Skills based on English Learning Competency 5*
(Analyze a story in terms of its elements. EN4RC- Ib-2.1.1)

	Frequency	*Percent*
Low Proficiency – Proficient	14	30.4
Low Proficiency – Highly Proficient	13	28.3
Nearly Proficient – Highly Proficient	9	19.6
Nor Proficient – Proficient	8	17.4
Nearly Proficient – Proficient	2	4.3
Total	46	100.0

Legend:

90 - 100	*Highly Proficient*
75 - 89	*Proficient*
50 -74	*Nearly Proficient*
25 - 49	*Low Proficiency*
0 - 24	*Nor Proficient*

Table 2.5 presents the results of pretest and posttest for the level of Literacy Skills in English competency 4 among a group of 46 individuals. The participants were evaluated on a scale ranging from "Nor Proficient" to "Highly Proficient", with additional categories of "Low Proficiency" and "Nearly Proficient" in between.

The results show that 30.4% of the participants achieved a level of competency that was rated as " Low Proficiency to Proficient ". 28.3% of the participants achieved a level of competency that was rated as "Low Proficiency to Highly Proficient". 19.6% of the participants achieved a level of competency that was rated as "Nearly Proficient to Highly Proficient". 17.4% of the participants achieved a level of competency that was rated as "Nor Proficient – Proficient". Finally, 4.3% of the participants achieved a level of competency that was rated as "Nearly Proficient to Proficient".

Overall, the results indicate that the majority of the participants achieved a Proficient level of English competency 5, with a relatively high percentage of participants achieving a rating of "Low Proficiency to Proficient".

Table 2.6. *Changes in the Level of Numeracy Skills based on Mathematics Learning Competency 1 (Identifies and describes triangles according to sides and angles. M4GE-IIIc-16)*

	Frequency	*Percent*
Nor Proficient – Highly Proficient	5	10.9
Nor Proficient – Proficient	3	6.5
Low Proficiency – Highly Proficient	17	37.0
Low Proficiency – Proficient	7	15.2
Nearly Proficient – Highly Proficient	10	21.7
Nearly Proficient – Proficient	3	6.5
Proficient – Highly Proficient	1	2.2
Total	46	100.0

Legend:

90 - 100	*Highly Proficient*
75 - 89	*Proficient*
50 -74	*Nearly Proficient*
25 - 49	*Low Proficiency*
0 - 24	*Nor Proficient*

Based on the given data, table 2.6 shows the frequency and percentage distribution of the change in level of Numeracy Skills for Mathematics competency 1. Out of the 46 participants, 5 (10.9%) Nor Proficient level but exceeded them, while 3 (6.5%) Nor Proficient level but were still considered Proficient. Meanwhile, 17 (37.0%) improved from a Low Proficiency level to Highly Proficient level, and 7 (15.2%) improved from Low Proficiency to Proficient level. Ten (21.7%) improved from a Nearly Proficient to Highly Proficient, and 3 (6.5%) improved from Nearly Proficient to Proficient. One participant (2.2%) showed improvement from a Proficient to Highly Proficient level.

These results suggest that most of the participants demonstrated an improvement in their numeracy level for Mathematics competency 1, with a significant number of them moving from Low Proficiency to Highly Proficient. It also indicates that some participants who initially in the level of Nor

Proficiency were able to improve and exceed expectations in this competency.

Table 2.7. *Changes in the Level of Numeracy Skills based on Mathematics Learning Competency 2 (Identifies and describes the different kinds of quadrilaterals: square, rectangle, parallelogram, trapezoid, and rhombus. M4GE-IIIc-17)*

	Frequency	*Percent*
Low Proficiency – Highly Proficient	15	32.6
Nearly Proficient – Highly Proficient	12	26.1
Nor Proficient – Highly Proficient	8	17.4
Nor Proficient – Proficient	5	10.9
Low Proficiency – Proficient	4	8.7
Nearly Proficient – Proficient	2	4.3
Total	46	100.0

Legend:

90 - 100	*Highly Proficient*
75 - 89	*Proficient*
50 -74	*Nearly Proficient*
25 - 49	*Low Proficiency*
0 - 24	*Nor Proficient*

Based on the given data, this table shows the frequency and percentage distribution of the change in level of Numeracy Skills for Mathematics in competency 2. Out of the 46 participants, 15 (32.6%) rated as "Low Proficiency to Highly Proficient", followed by 12 (26.1%) as "Nearly Proficient to Highly Proficient". Meanwhile, 8 (17.4%) improved from a being "Nor Proficient to Highly Proficient", and 5 (10.9%) improved from "Nor Proficient to Proficient". Four (8.7%) improved from "Low Proficiency to Proficient, and 2 (4.3%) participants improved from "Nearly Proficient to Proficient

These results suggest that most of the participants demonstrated in the study have an improvement in their numeracy level for competency 2 in Mathematics, with a significant number of them moving from "Low Proficiency to Highly Proficient".

Table 2.8. *Changes in the Level of Numeracy Skills based on Mathematics Learning Competency 3 (Determines the missing term/s in a sequence of numbers (e.g., odd numbers, even numbers, multiples of a number, factors of a number, etc.) M4AL-IIIe-5)*

	Frequency	*Percent*
Low Proficiency – Proficient	16	34.8
Nor Proficient – Proficient	7	15.2
Nearly Proficient – Highly Proficient	7	15.2
Nor Proficient – Highly Proficient	6	13.0
Nearly Proficient – Proficient	5	10.9
Low Proficiency – Highly Proficient	5	10.9
Total	46	100.0

Legend:

90 - 100	*Highly Proficient*
75 - 89	*Proficient*
50 -74	*Nearly Proficient*
25 - 49	*Low Proficiency*
0 - 24	*Nor Proficient*

Table 2.8 represents the change in level for Competency 3 in Math as perceived by the respondents. The data show the frequency and percentage of the different categories of change in level. Out of 46 respondents, 34.8% reported a change from Low Proficiency to Proficient, indicating improvement in their competence in this area. On the other hand, 15.2% reported a change from Nor Proficient level to Proficient level, while 13% reported a change from Nor Proficient level to Highly Proficient level. These results suggest that some respondents may have struggled with this competency initially but have shown improvement after the intervention.

Additionally, 15.2% of respondents reported a change from Nearly Proficient to Highly Proficient and another 10.9% reported a change from Nearly Proficient to Proficient. This indicates that some respondents who were already competent in this area have shown further improvement.

Lastly, 10.9% of respondents reported a change from Low Proficiency to Highly Proficient. These results suggest that a small proportion of respondents have shown exceptional improvement in their competence in this area.

Table 2.9. *Changes in the Level of Numeracy Skills based on Mathematics Learning Competency 4 (Visualizes the perimeter of any given plane figure in different situations. M4ME-IIIg-48)*

	Frequency	*Percent*
Low Proficiency – Proficient	13	28.3
Nearly Proficient – Highly Proficient	9	19.6
Nor Proficient – Highly Proficient	7	15.2
Low Proficiency – Highly Proficient	7	15.2
Nor Proficient – Proficient	6	13.0
Nearly Proficient – Proficient	4	8.7
Total	46	100.0

Legend:

90 - 100	*Highly Proficient*
75 - 89	*Proficient*
50 -74	*Nearly Proficient*
25 - 49	*Low Proficiency*
0 - 24	*Nor Proficient*

Table 2.9 shows that out of the 46 participants who took the test, 13 (28.3%) showed a change in their level of competency from "Low Proficiency to Proficient " in Competency 4 for Mathematics subject. Nine (19.6%) showed a change from "Nearly Proficient to Highly Proficient", while seven (15.2%) showed a change from "Nor Proficient to Highly Proficient", and another seven (15.2%) showed a change from "Low Proficiency to Highly Proficient". Six (13%) showed a change from "Nor Proficient to Proficient", and another six (13%) showed a change from "Nearly Proficient to Proficient".

Overall, the majority of participants showed improvement in their level of Numeracy Skills in competency 4 Mathematics, with a combined total of 20 participants (43.5%) showing improvement from "Low Proficiency" to "Highly Proficient" or "Proficient".

Table 2.10. *Changes in the Level of Numeracy Skills based on Mathematics Learning Competency 5 (Finds the perimeter of triangles, squares, rectangles, parallelograms, and trapezoids. M4ME-IIIi-51)*

	Frequency	Percent
Low Proficiency – Proficient	20	43.5
Low Proficiency – Highly Proficient	10	21.7
Nor Proficient – Proficient	8	17.4
Nearly Proficient – Highly Proficient	4	8.7
Nearly Proficient – Proficient	3	6.5
Nor Proficient – Highly Proficient	1	2.2
Total	46	100.0

Legend:

90 - 100	*Highly Proficient*
75 - 89	*Proficient*
50 -74	*Nearly Proficient*
25 - 49	*Low Proficiency*
0 - 24	*Nor Proficient*

This table shows the distribution of the changes in level for Mathematics in Competency 5 based on the responses of the participants. Out of the 46 participants, the largest group (20 participants or 43.5%) reported a change in level from Low Proficiency to Proficient in Mathematics Competency 5. The next largest group (10 participants or 21.7%) reported a change Low Proficiency to Highly Proficient, and another 8 participants (17.4%) reported a change from Nor Proficient level to Proficient level.

A smaller group of participants (4 participants or 8.7%) reported a change from Nearly Proficient to Highly Proficient, while 3 participants (6.5%) reported a change from Nearly Proficient to Proficient and 1 participant (2.2%) reported a change from Nor Proficient to Highly Proficient.

Overall, the results suggest that the majority of participants reported a positive change in their level of Numeracy skills for Mathematics, with a significant number of participants moving from Low Proficiency to Proficient, and some even moving from Nor Proficient level to Highly Proficient.

The Implication of Using Game-Based Learning in The Language and Numeracy Skills of The Grade 4 Learners of Santa Cruz North Central School

The use of Game-Based Learning (GBL) in the language and numeracy skills development of Grade 4 learners at Santa Cruz North Central School has several implications.

Firstly, GBL provides an engaging and interactive learning experience for students. By incorporating digital games and simulations, GBL captures the attention and interest of learners, making the learning process more enjoyable and motivating. This can lead to increased student engagement and active participation in language and numeracy activities.

Secondly, GBL offers opportunities for pupils to practice and reinforce language and numeracy skills in a meaningful context. The use of appropriate games and simulations aligned with specific learning objectives allows students to apply their knowledge and skills in real-life scenarios. This hands-on and practical approach can enhance their understanding and retention of language and numeracy concepts.

Additionally, GBL can promote collaboration and social interaction among learners. Many game-based learning platforms incorporate elements of teamwork, competition, and cooperative learning. Through group

activities and discussions related to the games, students can develop their communication and collaboration skills, fostering a supportive and interactive learning environment.

Furthermore, GBL provides immediate feedback and assessment. Most game-based learning systems offer real-time feedback on students' performance, allowing them to monitor their progress and identify areas for improvement. This timely feedback enables students to self-assess their language and numeracy skills and make necessary adjustments to enhance their learning.

Thus, using GBL in the language and numeracy skills development of Grade 4 learners can enhance their motivation, engagement, and understanding of language and numeracy concepts. Provision of an interactive and immersive learning experience, GBL has the potential to improve the overall quality of education and contribute to the students' language and numeracy proficiency.

Conclusiion

Based on the data gathered and presented in the study, the use of Game-Based Learning (GBL) strategies such as Kahoot Application, Quizizz, Quizlet Live, Educandy, Word Wall Online Application, Board Games, Spin the wheel, Game Show Quiz, Let's Go Fishing, Tree-angles, Pop A Balloon, Stepping the Ladder, and Team Games in teaching English and Mathematics skills improves the Grade 4 pupils' literacy and numeracy skills. In fact, GBL enhance the literacy skills in Using adverbs (adverbs of manner, place, and time) in sentences, distinguishing between general and specific statements, Identifying the main idea, key sentences, and supporting details from text listened to, Inferring the speaker's tone, mood, and purpose and Analyzing a story in terms of its elements. GBL develop the Numeracy in the following competencies: Identifying and describing triangles according to sides and angles, Identifying and describing the different kinds of quadrilaterals: square, rectangle, parallelogram, trapezoid, and rhombus, Determining the missing term/s in a sequence of numbers (e.g., odd numbers, even numbers, multiples of a number, factors of a number, etc.), Visualizing the perimeter of any given plane figure in different situations and Finding the perimeter of triangles, squares, rectangles, parallelograms, and trapezoids. The GBL approach also resulted in higher engagement, motivation, and retention of concepts learned among students. As such, it can be concluded that GBL is an effective teaching strategy for enhancing literacy and numeracy skill development in primary school students.The study's findings indicate that game-based learning is an engaging and interactive teaching approach that significantly improves the literacy and numeracy skills of Grade 4 learners at Santa Cruz North Central School. These results suggest that game-based learning can enhance education quality by promoting active participation and learning. Thus, teachers and instructional designers should consider incorporating game-based learning into their strategies and resources to enhance the learning experience and improve student outcomes.The study provides evidence that game-based learning is a promising teaching approach to improve academic performance and skill development, particularly in numeracy and literacy.

Based on the conclusion that Game-Based Learning (GBL) is an effective method for enhancing pupils' academic performance and skill development, particularly in numeracy and literacy, and considering its positive impact on the language and numeracy skills of Grade 4 learners at Santa Cruz North Central School, the following interventions are recommended to enhance the learning plan of teachers utilizing GBL:

1. Clearly define learning competencies: Teachers may clearly define the specific learning competencies and objectives they want their students to achieve through GBL. This includes:
   1.1 Using adverbs (adverbs of manner, place, and time) in sentences - EN4G-IIIe-16.
   1.2 Distinguishing between general and specific statements.
   1.3 Identifying the main idea, key sentences, and supporting details from text listened to - EN4LC- IIIg-1.1.
   1.4 Inferring the speaker's tone, mood, and purpose.
   1.5 Analyzing a story in terms of its elements.
   1.6 Identifying and describing triangles according to sides and angles - M4GE-IIIc-16.
   1.7 Identifying and describing the different kinds of quadrilaterals: square, rectangle, parallelogram, trapezoid, and rhombus - M4GE-IIIc-17.
   1.8 Determining the missing term/s in a sequence of numbers (e.g., odd numbers, even numbers, multiples of a number, factors of a number, etc.) -M4AL-IIIe-5.
   1.9 Visualizing the perimeter of any given plane figure in different situations - M4ME-IIIg-48.
   1.10 Finding the perimeter of triangles, squares, rectangles, parallelograms, and trapezoids - M4ME-IIIi-51.

2. Select appropriate GBL tools and resources: Teachers should carefully select GBL tools and

resources that align with the identified learning competencies. Considerations should include evaluating the educational content, interactivity, and relevance of the games and simulations to the targeted skills. Additionally, considering the diversity of learners' needs, it is crucial to choose resources that cater to different learning styles and abilities.

3. Integrate GBL in the lesson plans: Teachers may integrate GBL into their lesson plans in a purposeful and structured manner. This involves designing pre-game activities that introduce and contextualize the targeted skills, incorporating the game or simulation as the primary learning activity, and implementing post-game activities to reinforce and reflect on the learning outcomes. The seamless integration of GBL within the overall lesson plan ensures a cohesive and meaningful learning experience for students.

4. Provide guidance and scaffolding: Teachers may provide guidance and scaffolding to students while they engage in GBL activities. This include setting clear expectations, offering demonstrations and examples, providing prompts and cues during gameplay, and facilitating discussions to deepen understanding and promote critical thinking. By offering support, teachers can help students make connections between the game-based experiences and the targeted skills.

5. Monitor progress and provide feedback: Regularly monitoring students' progress and providing timely feedback is crucial in GBL. Teachers may track individual and group performance, assess the development of numeracy and literacy skills, and provide constructive feedback to guide students' growth. This feedback can be provided within the game-based environment or through subsequent discussions and assessments.

6. Foster collaboration and reflection: Teachers should create opportunities for collaborative learning and reflection during and after GBL activities. Encouraging students to work together, discuss strategies, and reflect on their experiences fosters deeper engagement and enhances their metacognitive skills. Group discussions and debriefing sessions can further consolidate learning and provide space for students to share insights and learn from one another.

By implementing these interventions, teachers can enhance the learning plan and maximize the benefits of GBL in developing the literacy and numeracy skills of Grade 4 learners. These recommendations aim to ensure a structured and effective integration of GBL into the classroom, fostering improved academic performance, and student engagement.

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