GAME-BASED LEARNING IN MATHEMATICS: A QUASI-EXPERIMENTAL STUDY ON STUDENT ACHIEVEMENT

Ivy Joy V. Jagonos, Romulo G. Doronio, PhD

Teacher I, Department of Education, Philippines
Faculty of Grad School, Assumption College of Nabunturan, Philippines

ABSTRACT

This study aimed to examine how Game-Based Learning (GBL) approach affected the performance of Grade 7 students in the Revised K-12 Curriculum. A quasi-experimental pretest-posttest group design was used to compare the experimental group, which got the game-based learning intervention utilizing Math Bingo and other interactive mathematics games, to the control group, which received traditional instruction. Pretest and posttest scores were gathered and evaluated using appropriate statistical techniques to find significant differences within and between the groups. The pretest scores of the experimental and control groups did not differ significantly, according to the results, suggesting that their baseline performance levels were similar. However, there was a substantial difference between the experimental group's pretest and posttest scores, suggesting progress following the implementation of game-based learning activities. Additionally, the posttest findings showed a substantial difference between the experimental difference between the experimental and control groups, with the experimental group attaining higher performance gains. These findings suggest that game-based learning effectively improved students' understanding and proficiency. The study comes to the conclusion that integrating game-based instructional strategies into mathematics instruction is advised as they are a useful intervention for improving students' mathematical performance.

Keywords: *Mathematics, game-based learning, mathematics achievement, quasi-experimental study*

1. INTRODUCTION

Concern over students' academic performance in mathematics has continued to grow, as many students struggle to perform at expected levels. This problem has an impact on both their academic achievement and their capacity to use mathematical concepts in practical settings. In everyday life, mathematics plays an important role because it influences logical reasoning, financial literacy, and problem-solving skills. Strong mathematical skills are associated with more career opportunities and higher levels of life satisfaction, according to Abin et al. (2020). Their research also shows that motivational and emotional factors, in addition to cognitive skills, influence mathematical ability. [1]

Poor achievement in mathematics is a significant challenge worldwide, affecting numerous countries. In Fiji, as part of the South Pacific, Chad et al. (2021) reported that many students developed negative attitudes towards mathematics, partly due to weaknesses in the secondary school curriculum. While teachers at the secondary level demonstrated strong professional capacity, limited expertise among primary educators contributed to declining interest and poor performance. [2]

In the Philippines, one of the priority concerns of the Department of Education is the dismal state of the mathematics achievement. A study conducted in Zambales involving 200 respondents results showed that the average grade of the students-respondents was 77.93, and that school related factors contribute to poor achievement in Mathematics. The results of the study suggested that the teacher should foster collaborative learning and create environments that encourage positive attitudes towards problem solving (Felipe & Funzalan, 2022). [3]

Mathematics underachievement remains a pressing issue in Maragusan, Davao de Oro, particularly at Pamintaran Integrated School, where students struggle with engagement and proficiency, especially when faced with abstract concepts and problem-solving tasks. This is especially evident in topics such as unit conversion, where students frequently struggle to connect mathematical concepts to real-world context. Over the past three years, the researcher has observed that lessons tend to stall when learners encounter difficulties applying these principles, often leading to a diminished interest and subsequent poor performance. In some cases, teachers accelerate lessons to meet curriculum requirements, but this approach sacrifices opportunities for students to develop critical thinking and problem-solving skills necessary for success.

Although interventions such as after-school programs and curriculum adjustments have been introduced, students at Pamintaran Integrated School continue to show low motivation and weak engagement in mathematics. Previous studies highlight the importance of motivation, engagement, and effective teaching strategies. (Callaman & Itaas, 2020; Felipe & Funzalan, 2022). However, little research has explored the potential of Math Bingo as a specific Game-based Learning (GBL) strategy in this local context. While global findings suggest that GBL can enhance interest and achievement, localized evidence for its efficacy among Grade 7 learners in Maragusan is lacking. Given these challenges, experimenting with GBL as a strategy for improving Mathematics 7 outcomes is both timely and necessary. [5]

2. RESEARCH METHODOLOGY

2.1. Research Design

This study employed a quasi-experimental research design to examine the effects of GBL on learners' achievement in mathematics. Specifically, it utilized a pretest-posttest design with two groups: one experimental group that received instruction through GBL and one control group that was taught using traditional methods. Both groups were assessed before and after the intervention to measure differences in academic performance. This approach aligned with the principles of quantitative research, which emphasize objective measurement, numerical data analysis, and determining relationships between variables (Creswell & Creswell, 2018).

The participants of the study consisted of 47 Grade 7 students from Pamintaran Integrated School during the School Year 2025–2026. Students were divided into the experimental and control groups, each undergoing a 45-minute class session. Prior to the intervention, both groups took a pretest to establish their baseline knowledge and skills in mathematics.

After the intervention, a posttest was administered to both groups. The comparison of pretest and posttest scores between the experimental and control groups was used to determine the effectiveness of GBL in improving students' mathematics achievement. A quasi-experimental design was appropriate in classroom-based settings where random assignment was not always feasible, but where group comparisons could provide insights into instructional effectiveness (Campbell & Stanley, 1963; Ghasemi & Zahediasl, 2012).

The results provided insights into the effectiveness of GBL as a strategy for enhancing motivation, engagement, and achievement in mathematics, offering evidence-based recommendations for classroom practice.

2.2. Research Subject

The research subjects of this study were 47 Grade 7 students from Pamintaran Integrated School during the School Year 2025–2026. The participants were selected through purposive sampling, a non-probability sampling technique in which individuals were deliberately chosen based on specific characteristics aligned with the objectives of the study. This method ensured that the sample consists of students who are most likely to provide relevant and meaningful data on the effectiveness of GBL in mathematics. Of the total respondents, 24 students were from Grade 7 Daffodil, while 23 students were from Grade 7 Marigold.

To maintain the relevance and comparability of the sample, inclusion criteria were applied. Only officially enrolled Grade 7 students were considered, ensuring alignment with the target curriculum and learning competencies. Participants also had prior exposure to basic measurement concepts, as indicated by academic records or teacher assessments, and must demonstrate consistent attendance and engagement in mathematics classes. Furthermore, students were available throughout the intervention period and were willing to participate in both the pretest and

posttest assessments. Informed consent from both students and their guardians was likewise obtained to uphold ethical research standards.

In contrast, the exclusion criteria eliminated students who were not officially enrolled in Grade 7, those with irregular attendance or frequent absences, and those who could not commit to the full duration of the intervention. Students with documented learning disabilities that significantly affected mathematics performance, or who had previously received specialized interventions in mathematics beyond the regular curriculum, were also excluded to avoid potential confounding effects. Additionally, students or parents who declined to provide informed consent were not included in the study.

By applying these criteria, the study focused on a relatively homogeneous group with shared educational experiences. This strengthened internal validity by ensuring that any observed changes in student achievement can be attributed primarily to the instructional intervention.

2.1. Research Instrument

A researcher-made test with 40 multiple-choice items served as the main tool for data collection in this study. The test was based on the Grade 7 Revised K–12 Mathematics Curriculum, focusing on the second quarter lessons. It ensured full coverage of the targeted learning competency on unit conversion in Metric, English, and non-standard systems. To ensure the right skills were assessed, a Table of Specifications (TOS) was created. This allowed the items to be systematically distributed across the needed cognitive levels.

The instrument acted as both the pretest and the posttest for the study. The pretest measured the students' baseline knowledge and initial competency level before instruction. The posttest evaluated how much their mathematical achievement improved after the GBL intervention.

To interpret learners' performance in a meaningful and standardized way, the study used competency descriptors as a framework for classifying students' achievement levels. These categories provided a consistent basis for analyzing and comparing the performance of the control and experimental groups. This structured approach ensured that test results were interpreted in a systematic manner and aligned with curriculum standards.

Using this validated and curriculum-based assessment tool, the researcher was able to gather reliable and relevant data needed to evaluate the effectiveness of GBL in improving students' mathematical skills and overall academic performance.

Table 1
Competency Level Descriptors

Rating Scale	Competency Level
92 and above	Full Mastery
83-91	Near Full Mastery
75-82	Mastery
51-74	Near Mastery
25-50	Low Mastery

3.

3.1. Procedure

The researcher secured all necessary ethical and administrative approvals before conducting the study. First, ethical clearance was obtained from the institution's Ethics Review Committee (ERC), ensuring that the study complied with

ethical principles, particularly in handling minors as participants. Once approved, the researcher requested an endorsement letter from the Dean of the Graduate School to formally authorize the research as part of the graduate requirements.

Following this, the researcher sought approval from the Schools Division Superintendent (SDS), followed by the endorsement of the Public Schools District Supervisor (PSDS). With these endorsements, a formal request letter was submitted to the school principal of Pamintaran Integrated School to secure permission to conduct the study within the school premises.

A 40-item multiple-choice test, along with a Table of Specifications, was developed by the researcher to measure students' mathematics achievement. An intervention plan was also crafted for the experimental group to guide the activities and track progress. Both the instrument and intervention plan were pilot-tested and validated by experts to ensure reliability, validity, and sufficiency of the time frame for the treatment.

Before the intervention, students took the pretest within a 25-minute time frame. A 5-minute break was then given prior to the 60-minute intervention program for the experimental group. After the intervention, participants were allowed a short health break before answering the posttest, which followed the same 40-item format as the pretest.

After the administration of the tests, all answer sheets were collected and checked manually by the researcher. The raw scores were encoded and organized in Microsoft Excel to ensure accuracy and convenience for statistical analysis. The compiled data were then forwarded to a statistician for statistical treatment, which provided the basis for addressing the research questions and determining the effectiveness of GBL on mathematics achievement.

3.2. Statistical Treatment of the Data

Mean. Group mean was computed to determine the level of competency (based on the scores) of the students in each group.

Class Proficiency. This was used to determine the competency level of two groups or the number of students who are meeting learning goals. Rather than just relying on the average score.

Paired T-Test. This t-test was utilized in computing the t-value of the pre- and post-test of each group to find whether there is a significant difference between the subjects' scores.

Independent T-Test. This t-test was utilized to compute the t-value of the post-tests of both groups and find whether there is a significant difference between the subjects' scores.

3.3. Ethical Considerations

Social Value. The purpose of this study was to examine the effectiveness of using GBL in improving student's achievement in Mathematics. The study assessed the effectiveness of this instructional approach in teaching Mathematics to Grade 7 students. The findings of this study may help enhance instructional methods, implement effective strategies and instructional approaches that aids in creating a learning environment where students are active participants and have autonomy of their own learning, thereby making lifelong and meaningful learning. The results may be shared with stakeholders such as mathematics teachers, school administrators, policymakers, and educational researchers to inform future educational practices and improve mathematics education. Furthermore, findings may be published in academic journals, contributing to the ongoing discussion about increasing student math performance.

Informed Consent. All selected subjects were given informed consent forms (ICFs) and assent forms. These documents clearly stated the researcher's name, institutional affiliation, the purpose of the study, and the procedures involved. Respondents were informed that their participation was entirely voluntary and that they could withdraw from the study at any moment with no academic or professional implications. All potential hazards and benefits were fully disclosed to allow respondents to make informed decisions regarding their participation.

Vulnerability of the Research Respondents. Since the study involved students, particular precautions were taken to

ensure that all respondents fully understand the study's objectives and procedures. Respondents were informed that they could skip any questions or withdraw from the study without any effect on their academic standing. The researcher also ensured that students were aware that they could ask questions at any point during the study and were provided support if they experienced discomfort during the process.

Risks, Benefits, and Safety. Respondents in the study were exposed to minimal risk. The results of the study provided evidence-based insights into innovative teaching strategies, helping educators refine their methods to enhance student learning outcomes. These findings may support policymakers in advocating the integration of GBL-based methods in schools to improve overall teaching effectiveness.

Privacy and Confidentiality of Information. The researcher protected the privacy and confidentiality of respondents in accordance with the Data Privacy Act of 2012. All personally identifiable information and collected data were securely stored, with access restricted only to the researcher. Data from the questionnaires were saved on password-protected devices and backed up in secure cloud storage, with only the researcher having access. To maintain anonymity, all identifying information was permanently deleted after the completion of the study.

Justice. Respondents in the study came from Pamintaran Integrated School. Respondents were selected using purposive sampling, ensuring an equal number of male and female respondents from the existing class or grade level. The researcher ensured that the selected respondents had adequate literacy skills necessary for understanding word problems.

Transparency. The researcher declared all relevant affiliations and the specific objectives of the study. Respondents were given the opportunity to review their responses to ensure the accuracy of the data obtained. All findings were shared with appropriate stakeholders to maintain transparency throughout the research process. The researcher also acknowledged the study's limitations and any potential conflicts of interest.

Qualification of the Researcher. The researcher possessed the relevant academic and professional qualifications to conduct the study. With experience in undergraduate and graduate-level research, the researcher was well-prepared to fulfill the ethical responsibilities of the study, including proper data collection, analysis, and interpretation in accordance with academic and ethical standards.

4. RESULTS

Competency Level of the Pretest Scores of the Groups

This section presents the results of the first statement of the problem that examines the competence level of the students' pretest scores.

Table 1
Competency Level of the Pretest Scores of Control and Experimental Group

Pretest	Mean	Class Proficiency	Competency Level
Control	14.43	36.08%	Low Mastery
Experimental	15.54	38.85%	Low Mastery

Competency Level of Posttest Scores of the Control and Experimental Groups

Table 2 presents the results of the posttest performance of the control and experimental groups.

Table 2
Competency Level of the Posttest Scores of Control and Experimental Group

Posttest	Mean	Class Proficiency	Competency Level

CONTROL	20.57	51.43%	Near Mastery
EXPERIMENTAL	24.42	61.05%	Near Mastery

Difference in pretest means scores between control and experimental group
Table 3 shows the results of the independent t-test to test the pretest of control and experimental group.

Table 3
Pretest of Control and Experimental Group

Pretest	Mean	p-value	t-value	Remarks
Control	14.43	0.376	-0.894	Not Significant
Experimental	15.54			

Difference between the pretest and posttest mean scores in the control group
Table 4 shows the results of the paired t-test used to compare the achievement of the students in the control group

Table 4
Pretest and Posttest of the Control Group

Control	Mean	p-value	t-value	Remarks
Pretest	14.43	0.000	-7.539	Significant
Posttest	20.57			

Difference between the pretest and posttest mean scores in the experimental group.
Table 5 shows the results of the paired t-test used to compare the achievement of the students in the experimental group.

Table 5
Pretest and Posttest of the Experimental Group

Experimental	Mean	p-value	t-value	Remarks
Pretest	15.54	0.000	-11.573	Significant
Posttest	24.42			

Difference in posttest means scores between the Control and Experimental Group
Table 6 shows the results of the computations comparing the students' achievements between the control and experimental groups as reflected in their posttest scores.

Table 6
Posttest of the Control and Experimental Group

Posttest	Mean	p-value	t-value	Remarks
Control	20.57	0.030	-2.23	Significant
Experimental	24.42			

5. CONCLUSION

The findings of this study revealed that GBL, especially structured activities like Math Bingo, is an effective instructional approach for improving the mathematics achievement of Grade 7 students. While both groups started with comparable pretest scores and similarly low mastery levels, the posttest outcomes revealed that the experimental group showed greater improvement than the control group after participating in game-based activities.

GBL provided an interactive and engaging classroom environment where students actively participated in mathematical tasks. It enhanced students' understanding of unit conversion, increased their motivation and confidence, reduced anxiety toward mathematics, and strengthened their collaboration and problem-solving abilities.

Overall, the integration of GBL in mathematics instruction had a positive impact on students by improving academic performance, classroom engagement, and overall learning experiences.

6. ACKNOWLEDGEMENT

I would like to extend my heartfelt gratitude and appreciation to the following individuals whose guidance and support have been instrumental in the completion of this study:

To Dr. Romulo G. Doronio, my thesis adviser, for generously sharing his time, knowledge, and expertise in guiding me throughout this research. Your patience, advice, and encouragement greatly enhanced the quality of this study;
To Dr. Roel P. Villocino, the Dean of the Graduate School and Chairman of the thesis panel. for his words of advice, encouragement, and unwavering inspiration. His guidance and belief in my abilities provided the necessary motivation to overcome challenges and complete this study;

To the members of the thesis panel, Dr. Roel Villocino, Dr. Felinita III R. Doronio, and Dr. Delfin J. Enargan for your invaluable suggestions and constructive comments that helped refine and improve this study. Your expertise greatly contributed to the final output of my research.

To Reynilda J. Balico, the School Head of Pamintaran Integrated School, for granting me the permission and support needed to carry out this study. Your encouragement made it possible to execute this research successfully.

To my co-teachers, friends, and colleagues, thank you for your constant moral support, prayers, and encouragement throughout this journey. Your presence and understanding kept me motivated.

To my beloved family, Mama Emma, Papa Polin, and my siblings- Manang Myrla, Ate Tata, Manding Michelle, Kuya Junry, Jeffrey, Michael, Idel Jay, Edil Jane, and Cris and my nephews and nieces; for their unwavering support, patience, and unconditional love. Your belief in me has been my source of strength and determination throughout this journey.

To my husband, Ronnel, and my beloved twins, Zhen Vyronn and Steph Zyronn, your love, patience, and constant support have been my greatest inspiration. Your presence in my life gave me the motivation to overcome challenges and reach this significant milestone.

To all those who have directly or indirectly contributed to this study, your support, whether big or small, have made a meaningful difference and I am sincerely grateful.

Above all, I give thanks to Almighty God, for granting me the strength, wisdom, and guidance to complete this academic journey.

7. REFERENCES

[1] Abín, A., Núñez, J. C., Rodríguez, C., Cueli, M., García, T., & Rosário, P. (2020). Predicting mathematics achievement in secondary education: The role of cognitive, motivational, and emotional variables. *Frontiers in Psychology, 11*, 876. https://doi.org/10.3389/fpsyg.2020.00876
[2] Aguilar, J., Holman, C., & Fishman, B. (2020). GBL and student engagement: A systematic review. *Journal of Educational Technology & Society, 23*(1), 45–60.

[3] Adipat, S., Laksana, K., Busayanon, K., Asawasowan, A., & Adipat, B. (2021). Engaging students in the learning process with GBL: The fundamental concepts.*International Journal of Technology in Education, 4*(3), 542-552. https://doi.org/10.46328/ijte.169
[4] Anderson, D., & Krasnor, J. (2019). Scaffolding and collaborative learning in digital environments. *Educational Psychology Review, 31*(4), 523-540. https://files.eric.ed.gov/fulltext/EJ1168944.pdf
[5] Boaler, J. (2019). *Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages, and innovative teaching*. Jossey-Bass. [6] Boadu, S. K., & Boateng, F. O. (2024). Enhancing students' achievement in mathematics education in the 21st century through technology integration, collaborative learning, and student motivation. *EURASIA Journal of Mathematics, Science and Technology Education, 20*(11), em2534.
[7] Bragg, L. A. (2012). Testing the effectiveness of mathematical games as a pedagogical tool for children's learning. International Journal of Science and Mathematics Education, 10(6), 1445–1467. https://doi.org/10.1007/s10763-012-9349-9
[8] Brown, L., & Patel, R. (2020). Gamification in mathematics education: Balancing engagement and learning outcomes. *Journal of Educational Research, 92*(3), 204-219. https://pubs.sciepub.com/jitl/4/1/3/index.html
[9] Campbell, D. T., & Stanley, J. C. (1963). Experimental and quasi-experimental designs for research. Houghton Mifflin
[10] Chand, S., Chaudhary, K., Prasad, A., & Chand, V. (2021). Perceived causes of students' poor performance in mathematics: A case study at Ba and Tavua secondary schools. *Frontiers in Applied Mathematics and Statistics, 7*, 614408.
[11] Chand, M., Rimal, A., & Banerjee, D. (2021). Students' difficulties in measurement concepts: A diagnostic study. *Journal of Mathematics Education, 14*(2), 67–80.
[12] Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). SAGE Publications.
[13] Cruz, M. A., & Ramirez, R. E. (2019). GBL in mathematics: Effects on student engagement and performance. Journal of Educational Research and Practice, 9(2), 56–67.
[14] Debrenti, E. (2024). GBL experiences in primary mathematics education.*Frontiers in Education,9*.https://www.frontiersin.org/journals/education/articles/10.3389/feduc.2024.13313
[15] Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227–268.
[16] DepEd. (2020). *National Achievement Test Report*. Department of Education.
[17] Erickson, P. (2025). Can a math game improve social-emotional learning skills? *MIND Research*. Retrieved from https://blog.mindresearch.org/blog/can-a-math-game- improve-social-emotional-learning-skills
[18] Erşen, Z. B., & Ergül, E. (2022). Trends of GBL in mathematics education: A systematic review. *International Journal of Contemporary Educational Research, 9*(3), 262-278. https://doi.org/10.33200/ijcer.1109501
[19] Felipe, R., & Funzalan, R. (2022). Factors affecting the mathematical performance of Filipino learners. *Philippine Journal of Education, 105*(3), 23–35.
[20] Garcia, M., & Lee, P. (2021). The role of collaboration in GBL for mathematics. *Computers in Education, 65*(2), 312-326. https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2023.1105 806/full
[21] Gee, J. P. (2007). *What video games have to teach us about learning and literacy*. Palgrave Macmillan.
[22] Ghasemi, A., & Zahediasl, S. (2012). Normality Tests for Statistical Analysis: A Guide for Non-Statisticians. International Journal of Endocrinology and Metabolism, 10, 486-489. https://doi.org/10.5812/ijem.3505
[23] Gonzalez, M., DeJarnette, A. F., & Hailey, C. (2020). Adaptive learning in mathematics: Addressing anxiety through personalized pathways. *Journal of Educational Technology Research and Development, 68*(4), 1159-1178.
[24] Hansen, R., & McMillan, S. (2021). Embedding assessments within game-based learning: Strategies for mathematics education. *Journal of Learning Analytics, 48*(1), 112-129. https://scimatic.org/storage/journals/11/pdfs/3613.pdf
[25] Huang, R., & Shimizu, Y. (2021). Influence of GBL in mathematics education on students' cognitive and affective domains: A systematic review. *Journal of Educational Technology, 45*(2), 135-152.
[26] Hui, H. B., & Mahmud, M. S. (2023). Influence of GBL in mathematics education on the students' cognitive and affective domain: A systematic review. *Frontiers in Psychology, 14*, Article 1105806.

[27] Hussein, M., Hassan, R., & Othman, N. (2022). GBL and student performance in mathematics. *Education Sciences, 12*(8), 543–557.
[28] Johnson, E., & Wang, C. (2020). Immediate feedback and its role in game-based mathematics learning. *Journal of Digital Education, 56*(2), 276-294. https://files.eric.ed.gov/fulltext/EJ1311472.pdf
[29] Karakolidis, A., Pitsia, V., & Efstathiou, M. (2021). The impact of GBL on students' attitudes toward mathematics. *Educational Psychology Review, 33*(2), 591-617. https://doi.org/10.1007/s10648-021-09588-3
[30] Kim, J., Patel, R., & Wang, Y. (2019). Primary school students' perceptions of scaffolding in digital GBL in mathematics. *Computers in Education, 67*(3), 178-196.
[31] Lee, C., Johnson, T., & Parker, L. (2020). Improving students' mathematical problem-solving skills through Quizizz. *Mathematics Education Review, 48*(1), 99-122. https://files.eric.ed.gov/fulltext/EJ1281063.pdf
[32] McLaren, B. M., Adams, D. M., Mayer, R. E., & Forlizzi, J. (2017). A computer-based game that promotes mathematics learning more than a conventional approach. *International Journal of GBL, 7*(1), 36-56.
[33] Mcleod, S., & Baker, R. (2022). Direct instruction and procedural learning in mathematics. *Educational Psychology Review, 34*(2), 987–1010.
[34] Mullis, I. V. S., Martin, M. O., Foy, P., et al. (2020). *TIMSS 2019 International Results in Mathematics and Science*. TIMSS & PIRLS International Study Center.
[35] OECD. (2019). *PISA 2018 Results: What Students Know and Can Do*. OECD Publishing.
[36] Papadakis, S. (2021). The impact of GBL on student motivation and engagement. *Computers in Human Behavior, 120*, 106–725.
[37] Plass, J. L., Homer, B. D., & Kinzer, C. K. (2015). Foundations of GBL. *Educational Psychologist, 50*(4), 258-283.
[38] Ramani, G., & Eason, S. (2015). The role of peer interaction in mathematical learning: A social constructivist perspective. *Educational Psychology Review*.
[39] Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. Harvard University

BIOGRAPHY

IVY JOY V. JAGONOS

IVY JOY V. JAGONOS is a graduate student of the Master of Arts in Education, Major in Mathematics at Assumption College of Nabunturan, Nabunturan, Davao de Oro. She is currently a teacher at Pamintaran Integrated School, where she actively engages in developing students' mathematical skills through innovative and learner-centered approaches.

Her academic interests include mathematics education, game-based learning, and the integration of technology in teaching. She conducted a study on the effectiveness of game-based learning as an intervention to improve students' achievement in mathematics, reflecting her commitment to enhancing both teaching practices and student learning outcomes.

She is married to Ronnel Jagonos and is blessed with twins, Zhen Vyronn and Steph Zyronn. Her family serves as her constant source of inspiration and support in pursuing her academic and professional goals.

She aspires to continue contributing to the field of education by promoting effective, engaging, and meaningful learning experiences for students.