Kahoot: Sparking Innovation and Engagement in Modern Teaching

Nelson S. Lubguban, Jr; Lorenzo I. Balili, Jr; Dr. John Mart Elesio

Holy Cross of Davao College, Davao del Sur, Philippines

DOI: https://dx.doi.org/10.47772/IJRISS.2025.905000327

Received: 05 May 2025; Accepted: 13 May 2025; Published: 13 June 2025

ABSTRACT

This action research investigated the impact of Kahoot!, a game-based digital platform, on the mathematics performance of Grade 6 learners at Communal Elementary School. The study was prompted by concerning trends in mathematics achievement, with national proficiency levels at only 33%. Through classroom observations and stakeholder interviews, researchers identified a misalignment between traditional teaching methods and students' learning preferences as a primary root cause. The intervention was systematically implemented across all 317 Grade 6 learners following a three-phase approach: pre-implementation assessment and preparation, structured implementation with regular Kahoot! sessions, and post-implementation evaluation. A paired samples t-test revealed significantly higher mathematics performance after the Kahoot! intervention ($M = 6.216$, $SD = .098$) compared to pre-intervention scores ($M = 4.414$, $SD = 1.871$), $t(273) = -13.320$, $p < .001$, with a large effect size (Cohen's $d = -.806$). Thematic analysis of teacher reflections identified four key dimensions of implementation experience: initial skepticism and gradual engagement, differential student responses, pedagogical adaptation and professional growth, and emotional complexity. The intervention particularly benefited previously disengaged students, while high-achieving students maintained consistent performance. Despite limitations related to response heterogeneity, the findings advocate for continued implementation of game-based learning platforms in mathematics education, with recommendations for investigating moderating factors and optimizing implementation strategies.

Keywords: Game-based learning, Mathematics education, educational technology, Student engagement, Instructional innovation

CONTEXT AND RATIONALE

Our research team decided to conduct our action research at Communal Elementary School since I am the school principal of the said institution. In our problem identification activity, we observed a concerning trend in the academic performance of our Grade 6 learners. Based on our third quarter proficiency level report, there was a significant decline in mathematics achievement, which aligns with the recent National Achievement Test (NAT) results showing a mere 33% proficiency level nationwide. This alarming statistic prompted us to conduct a thorough analysis of the factors contributing to this educational challenge. Through classroom observations, teacher interviews, and student feedback, we identified that the primary root cause lies in the misalignment between our teachers' instructional strategies and our learners' diverse learning styles and preferences.

In examining this issue more closely, we noticed that traditional teaching methods predominantly employed in our mathematics classes often fail to engage students effectively. Second, many of our learners belonged to the digital native generation, yet our instructional approaches remained largely conventional and teacher-centered. This disconnect became particularly evident when we observed how students responded more positively to technology-integrated activities during occasional computer laboratory sessions. The gap between our current teaching methodologies and our students' learning preferences created a barrier to effective mathematics instruction.

After careful consideration of various intervention strategies, we believed that implementing online interactive applications for classroom drills and assessments presented the most viable and sustainable solution. This approach was particularly promising because it required minimal additional resources, as our school already had

basic technological infrastructure in place. Furthermore, digital tools could provide immediate feedback, could allow for differentiated instruction, and could create an engaging learning environment that appeals to our students' natural inclination toward technology. This solution not only addressed our immediate concerns but also prepared our learners for the increasingly digital future of education while providing our teachers with valuable data to track student progress and adjust their teaching strategies accordingly.

The need to address this educational challenge was pressing and could not be delayed further. As our students prepare to transition to secondary education, their foundational mathematics skills are crucial for their future academic success. The persistent low proficiency levels not only affect their current academic performance but also pose a significant risk to their ability to cope with more advanced mathematical concepts in higher grades. Moreover, with the rapid advancement of technology and its increasing integration into various aspects of life, our failure to adapt our teaching methods could potentially widen the achievement gap and leave our students ill-prepared for the demands of the modern world. Therefore, implementing these interventions was prioritized to ensure we could begin seeing improvements in student performance by the next academic quarter.

The implementation of this solution and the findings of this study significantly benefited multiple stakeholders in our educational community. Primary beneficiaries include our Grade 6 learners who experienced more engaging and effective mathematics instruction tailored to their learning preferences. Our mathematics teachers gained valuable insights and tools to enhance their teaching strategies. Additionally, school administrators and future researchers would benefit from the documented effectiveness of technology integration in mathematics education, potentially informing policy decisions and future educational interventions in similar contexts.

Proposed Intervention, Innovation, and Strategy

This study used Kahoot! as an intervention to address the pressing need to improve the mathematics performance of our Grade 6 learners. Kahoot! has revolutionized education by introducing gamified learning experiences that enhance student engagement. According to Wang, Tahir, and colleagues (2020), Kahoot! improves learning outcomes across various educational levels, fostering excitement and motivation through interactive quizzes and competitive elements. This leads to increased participation and better retention of information. Additionally, research by Özdemir (2025) supports these findings, highlighting Kahoot!'s positive impact on student learning outcomes and motivation.

Moreover, Kahoot! offers real-time assessment capabilities, providing teachers with immediate feedback on students' understanding. This allows educators to identify areas needing clarification and adjust their strategies accordingly. Barraza (2023) highlights the value of real-time assessment in enhancing the learning process and ensuring key concept comprehension. Additionally, a meta-analysis by WiKIT (2024) confirms that Kahoot! improves students' academic performance by a full letter grade on average.

Accessibility is a significant advantage of Kahoot! The platform can be accessed from various devices, making it versatile for in-person and remote learning. This flexibility ensures students can engage with content regardless of location, as noted by Leavitt (2023). Additionally, the ease of access promotes inclusivity, benefiting students from diverse backgrounds. Research by Kucirkova (2024) emphasizes Kahoot!'s role in supporting learners' mental well-being and reducing anxiety.

Customization is a key feature of Kahoot!, allowing educators to tailor quizzes and activities to meet student needs. Teachers can create content aligned with their curriculum and learning objectives. This adaptability makes Kahoot! valuable across various subjects, as emphasized by Barraza (2023). The ability to customize content ensures relevant and meaningful learning experiences. Additionally, a meta-analysis by Özdemir (2025) found that Kahoot! enhances knowledge retention and academic achievement.

Indeed, Kahoot!, a digital quiz platform, has emerged as a significant innovation in the realm of instruction by gamifying the learning process, promoting student engagement, providing immediate feedback, fostering inclusive participation, and offering valuable data-driven insights. This review explores the various dimensions of Kahoot!'s impact on modern teaching practices, examining the literature on its effectiveness and implications for educational outcomes.

Gamified Learning. The gamified nature of Kahoot! transforms traditional learning into an enjoyable and interactive experience. Alsswey and Malak (2024) found that gamification in education can lead to higher levels of student participation and enjoyment. Montenegro-Rueda, Fernández-Cerero, Mena-Guacas, and Reyes-Rebollo (2023) reported that incorporating game elements into learning activities enhances students' intrinsic motivation. Similarly, Garza et al. (2023) concluded that gamification positively impacts user engagement and learning outcomes. This suggests that utilizing Kahoot! can make learning more enjoyable and motivate students to actively participate in their education.

Immediate Feedback. Kahoot! provides students with instant feedback on their answers, allowing them to understand their mistakes and learn from them in real-time. Shawwa and Kamel (2023) emphasize the importance of timely feedback in improving student performance. Barragán-Pulido et al. (2023) argue that formative feedback is crucial for learning, as it helps students identify areas for improvement. Alsswey and Malak (2024) highlight that immediate feedback can increase students' self-regulation and learning efficacy. This indicates that the immediate feedback provided by Kahoot! can enhance students' understanding and self-regulatory skills, leading to better academic performance.

Inclusive Participation. Moreover, Kahoot! encourages participation from all students, including those who may be reluctant to speak up in a traditional classroom setting. Montenegro-Rueda et al. (2023) found that digital quizzes can foster a more inclusive learning environment by allowing all students to contribute. Shawwa and Kamel (2023) noted that student response systems, like Kahoot, can increase participation and engagement. Barragán-Pulido et al. (2023) reported that these systems help create a more interactive and dynamic classroom experience. This implies that Kahoot! can help create a more inclusive and engaging classroom environment where all students feel comfortable participating.

Versatility in Use. Furthermore, Kahoot! can be used for various subjects and topics, making it a versatile tool for teachers to assess understanding and reinforce learning. Garza et al. (2023) state that digital quiz platforms can be easily adapted to different educational contexts and learning objectives. Shawwa and Kamel (2023) argue that flexible learning tools can support diverse instructional strategies. Barragán-Pulido et al. (2023) found that technology-enhanced learning environments can accommodate various teaching methods and student needs. This suggests that the versatility of Kahoot! allows it to be integrated into a wide range of educational settings, enhancing its effectiveness as a teaching tool.

Data-Driven Insights. In addition, Kahoot! offers teachers access to detailed reports and analytics on student performance, helping them identify areas where students may need additional support. Alsswey and Malak (2024) highlight the importance of data-driven decision-making in education. Garza et al. (2023) found that data analytics can provide valuable insights into student learning patterns and outcomes. Montenegro-Rueda et al. (2023) emphasize that data-driven feedback can improve instructional practices and student learning. This signifies that the data-driven insights provided by Kahoot! can help teachers tailor their instruction to better meet the needs of their students.

Given the multifaceted impact of Kahoot! as an innovation in instruction, this intervention was introduced to our grade 6 learners starting the 4th quarter of this school year. The implementation of Kahoot! as an interactive platform during concept exercises and assessment followed a systematic approach.

For the intervention to be successfully implemented, the study followed the activities for every phase of the implementation. For the Pre-Implementation Phase, the School Principal, together with the Mathematics Department Head, initiated the intervention by conducting a comprehensive needs assessment and infrastructure evaluation. The Grade 6 Mathematics teachers were responsible for administering a standardized pre-test to establish baseline mathematical competencies, developing content-aligned Kahoot! quizzes, and preparing assessment rubrics for data interpretation. The ICT Coordinator ensured adequate technological resources and internet connectivity, while also conducting basic Kahoot! training for teachers. The School Principal coordinated with the Parent-Teacher Association President to communicate the intervention plan and secure necessary parental support. The Grade Level Coordinator prepared implementation timelines and monitoring tools, ensuring alignment with the curriculum standards and learning competencies. The Mathematics Department Head ensured the pre-test's validity and reliability.

Meanwhile, during the Implementation Phase, the Grade 6 Mathematics teachers took the lead in executing regular Kahoot! sessions, with each teacher responsible for documenting student participation and performance. The ICT Coordinator provided real-time technical support during sessions, while teacher-aides assisted in device distribution and collection. The Mathematics Department Head conducted weekly monitoring of implementation fidelity and addressed emerging pedagogical concerns. The Master Teacher observed student engagement and provided support for struggling learners. The Grade Level Coordinator consolidated weekly reports and facilitated regular alignment meetings to discuss progress and challenges. Mid-way through the implementation, teachers conducted a formative assessment to track progress.

Finally, in Post-Implementation Phase, the Grade 6 Mathematics teachers administered a standardized post-test using the same format and difficulty level as the pre-test. The Mathematics Department Head, assisted by the Grade 6 teachers, led the comparative analysis of pre-test and post-test scores, along with student performance data and engagement metrics from Kahoot! sessions. Then, the School Principal reviewed comprehensive reports comparing pre-test and post-test results and presented findings to stakeholders. Meanwhile, the ICT Coordinator evaluated technical aspects and recommended infrastructure improvements. The Master Teacher assessed the intervention's impact on student attitudes and motivation through surveys and interviews. The Grade Level Coordinator documented the best practices and areas for improvement. The School Principal, Mathematics Department Head, and Grade Level Coordinator collaboratively developed sustainability plans based on pre-test and post-test data analysis.

Action Research Question

This action research aimed to find out the impact of the Kahoot! as an intervention to address the pressing need to improve the mathematics performance of our Grade 6 learners. Further, this study intended to answer this action research question: Will Kahoot! improve the mathematics performance of our Grade 6 learners?

Action Research Methods

Participants, Other Sources of Data, and Information

The participants of this study were the 317 Grade 6 learners enrolled at one of the schools in Buhangin East District with the school ID of 129509. The intervention was implemented at the specific grade level involving all Grade 6 learners. The data to be gathered in this study was based on the validated and pilot-tested competency-based 15-item pre-test and posttest results. Moreover, other important sources of data to support the findings of the study such as the focus group discussion notes with the teachers implementing the strategy were utilized.

Data Gathering Methods

Asking Permission. The study began with securing approval from proper authorities, that is, the Dean of the Graduate School for his endorsement, the Schools Division Superintendent of Davao City through the Research Committee of the Division Office, and the Public Schools District Supervisor of Buhangin East District.

Validating and Pilot Testing Research Instrument. The pre-test and post-test tools underwent content validation by three Mathematics Education experts. After incorporating their suggestions, the instruments were pilot tested with 30 Grade 6 students from a different school to establish reliability using Cronbach's alpha.

Acquisition of Consent. Informed consent forms were distributed to parents/guardians of participating Grade 6 students, explaining the study's purpose, procedures, and confidentiality measures. Teachers involved in the implementation also signed consent forms acknowledging their roles and responsibilities.

Conduct of Pre-test and Post-test. The validated pre-test was administered before implementing Kahoot! to establish baseline performance. After three weeks of intervention, the post-test was conducted under similar testing conditions to measure the impact on students' mathematical performance.

Tallying and Interpretation of Results. Test papers were checked using standardized rubrics. Scores were encoded in Microsoft Excel for statistical analysis. Mean scores, standard deviation, and t-test were computed

to determine significant differences between pre-test and post-test results.

Data Analysis Plan

Data was analyzed using appropriate descriptive statistics and presented in graphs based on the monitoring checklist in the pre-implementation and implementation phases. Meanwhile, for the notable observations of the teachers' experiences on the implementation of the intervention, a simple thematic analysis was utilized to organize and simplify the complexity of the data into meaningful and manageable codes, categories, and themes (Braun & Clarke, 2019).

RESULTS AND DISCUSSION

Paired Samples t-Test

A paired samples t-test was performed to evaluate whether there was a difference between the academic performance of Grade 6 learners in Mathematics before and after they received the intervention using Kahoot! exercises. Table 1 shows the result of analysis on the mean difference between pre-test and post-test results.

Table 1. Results of Analysis Examining the Mean Difference between Pre-Test and Post-Test

Intervention	Pre-Test		Post-Test		*t*(273)	*p*	Cohen's *d*
	M	SD	M	SD			
Kahoot!	4.414	1.871	6.216	.098	-13.320	<.001	-.806

As shown in Table 1, the results indicated that the academic performance of Grade 6 learners in Mathematics after they received the Kahoot! intervention (M = 6.216, SD = .098) was significantly higher than before they received the Kahoot! intervention (M = 4.414, SD = 1.871), $t(273) = -13.320$, $p < .001$. Moreover, the effect size (Cohen's d = -.806) indicated a large practical significance, suggesting that the Kahoot! intervention had a substantial positive impact on students' mathematical performance.

Analysis

The significant improvement in mathematics achievement aligns with current research on Kahoot! as an educational intervention. The substantial increase in mean scores from pre-test (M = 4.414) to post-test (M = 6.216), coupled with a large effect size (Cohen's d = -.806), demonstrates the effectiveness of Kahoot! as a learning tool in mathematics education.

This finding supports Wang et al.'s (2020) research indicating that Kahoot! improves learning outcomes across various educational levels by enhancing student engagement through interactive and competitive elements. The significant improvement observed in our study also validates Özdemir's (2025) findings on Kahoot!'s positive impact on student learning outcomes and motivation.

Furthermore, the dramatic decrease in standard deviation from pre-test (SD = 1.871) to post-test (SD = .098) indicates a more homogeneous performance among students after the intervention. This aligns with WiKIT's (2024) meta-analysis confirming that Kahoot! improves students' academic performance by a full letter grade on average. The increased consistency in student performance may be attributed to what Alsswey and Malak (2024) described as gamification leading to higher levels of student participation and enjoyment.

The effectiveness of Kahoot! in our study can be explained through several mechanisms highlighted in the literature. First, as noted by Shawwa and Kamel (2023), the immediate feedback provided by Kahoot! allows students to understand and learn from their mistakes in real-time, which is crucial for improving performance. Second, Montenegro-Rueda et al. (2023) found that digital quizzes like Kahoot! foster a more inclusive learning environment, encouraging participation from all students, including those who might be reluctant to speak up in traditional classroom settings.

Additionally, the large effect size observed in our study is consistent with Barragán-Pulido et al.'s (2023) argument that formative feedback is crucial for learning, as it helps students identify areas for improvement. The data-driven insights provided by Kahoot!, as highlighted by Garza et al. (2023), likely enabled teachers to tailor their instruction to better meet student needs, contributing to the significant improvement in mathematics performance.

The substantial impact of Kahoot! on Grade 6 mathematics performance demonstrated in this study reinforces Barraza's (2023) emphasis on the value of real-time assessment in enhancing the learning process and ensuring comprehension of key concepts. Moreover, the platform's ability to transform traditional learning into an enjoyable and interactive experience, as noted by Alsswey and Malak (2024), likely contributed to increased student motivation and engagement, further explaining the significant improvement in academic performance.

Thematic Analysis

After the implementation of Kahoot! as an intervention, teachers were gathered to provide their insights, reflections, and comments on their experiences in implementing the strategy. Table 2 provides rich insights into the multifaceted experience of implementing Kahoot in mathematics instruction. The teacher reflections reveal a complex journey encompassing technological adaptation, pedagogical transformation, and emotional processing.

Table 2: Teacher Reflections on Kahoot Implementation in Mathematics Instruction

Discourse and Dimensions	**Extracted Statements**
Initial Skepticism and Gradual Engagement [a]	
Cautious adoption of new technology	"At first, I was not sure if Kahoot would work in my math class. After a few days, I saw how much the students liked it." "I was slow to use all of Kahoot's tools." "I started with simple quizzes before trying the more complex features."
Gradual comfort with interactive learning platforms	"Each day I felt more at ease using Kahoot with my students." "By week two, I looked forward to our Kahoot sessions."
Validation through tangible performance improvements	"Seeing their test scores go up made me believe in the tool." "The students' progress showed me that this new way works."
Observation of Differential Student Responses [b]	
Identifying high-performing students maintaining consistent performance	"My top students still did well with Kahoot." "The smart kids enjoyed the competition, but their scores stayed about the same."
Noting unexpected improvements among previously struggling learners	"I was surprised by which students did better with the games." "Some students who never raised their hands before were now joining in." "The quiet kids in the back row suddenly became active participants."
Witnessing varied intervention effectiveness across student profiles	"Boys seemed to love the game aspect more than girls." "Students who like video games picked up Kahoot faster than others."

Pedagogical Adaptation and Professional Growth [c]	
Increased technological competence	"I learned new ways to make learning fun and still educational." "Now I can set up a Kahoot quiz in just five minutes." "I've learned how to fix common tech problems on my own."
More personalized assessment techniques	"Kahoot changed how I teach math problems." "I can now see which questions each student struggles with." "Kahoot helps me know exactly what to review the next day."
Improved ability to interpret real-time learning data	"The colored charts show me right away who needs help." "I can spot problem areas while we are still in class."
Emotional and Professional Complexity [d]	
Initial apprehension	"I worried I would look stupid in front of my students." "What if the internet goes down during the quiz?"
Gradual confidence building	"Each successful class made me surer of myself." "By week three, I felt like a Kahoot expert."
Pride in student performance improvements	"Seeing their scores go up made me so happy." "I felt proud when they cheered after beating their old scores."
Professional self-reflection	"Kahoot made me think about how I've been teaching all these years." "I wonder what other new tools might help my students."

Initial Skepticism and Gradual Engagement

The dimension of *Cautious adoption of new technology* reflects teachers' initial hesitation toward implementing game-based learning tools like Kahoot in mathematics instruction. This aligns with Wang and Tahir's (2020) findings that while Kahoot improves learning outcomes across various educational levels, educators often approach its implementation gradually, beginning with simple quizzes before exploring more complex features. The teacher's progression from uncertainty to acceptance mirrors the implementation journey documented in current literature.

The Gradual comfort with interactive learning platforms dimension shows a progression in teacher confidence. Montenegro-Rueda et al. (2023) reported that incorporating game elements into learning activities enhances not only students' intrinsic motivation but also teachers' comfort with digital platforms over time. The teacher's reflection about looking forward to Kahoot sessions by week two demonstrates this adaptation process.

Validation through tangible performance improvements reflects how teachers' acceptance of educational technology is often contingent on observable student outcomes. This supports the meta-analysis by WiKIT (2024) which confirmed that Kahoot improves students' academic performance by a full letter grade on average. The teacher's statement about seeing test scores improve aligns with this research, suggesting that concrete performance metrics strongly influence teacher buy-in.

Observation of Differential Student Responses

The dimension of Identifying high-performing students maintaining consistent performance indicates that gamification interventions like Kahoot may not significantly impact high-achieving students. While the teacher noted that "top students still did well with Kahoot," this observation parallels findings from Barragán-Pulido et al. (2023) suggesting that digital quiz platforms primarily enhance engagement rather than dramatically altering

performance trajectories of already successful students.

In contrast, noting unexpected improvements among previously struggling learners highlights one of the most significant benefits of gamification in mathematics. The statements about previously disengaged students becoming active participants corroborates Montenegro-Rueda et al.'s (2023) research demonstrating that digital quizzes can foster a more inclusive learning environment, particularly benefiting students who might be reluctant to participate in traditional settings. Kucirkova's (2024) research on Kahoot's role in supporting learners' mental well-being and reducing anxiety further explains why previously quiet students might become more engaged.

The Witnessing varied intervention effectiveness across student profiles dimension acknowledges gender and prior gaming experience as potential moderating factors. While the teacher observed that "boys seemed to love the game aspect more than girls," recent research by Alsswey and Malak (2024) on gamification in education suggests that designing inclusive gamified experiences requires attention to diverse student profiles and preferences.

Pedagogical Adaptation and Professional Growth

The Increased technological competence dimension reflects teachers' professional development through technology implementation. The teacher's statements about learning "new ways to make learning fun and still educational" and being able to "fix common tech problems" independently align with Barraza's (2023) findings on how educators develop technical proficiency through consistent engagement with platforms like Kahoot.

More personalized assessment techniques highlights how game-based tools transform assessment practices. The teacher's reflection on seeing which questions each student struggles with supports Shawwa and Kamel's (2023) emphasis on the importance of timely feedback in improving student performance. This dimension also reflects Barraza's (2023) assertion about the value of real-time assessment in enhancing the learning process.

The Improved ability to interpret real-time learning data dimension reflects how gamification platforms enhance teachers' data literacy. Garza et al. (2023) found that data analytics can provide valuable insights into student learning patterns and outcomes. The teacher's comments about using colored charts to identify struggling students in real-time exemplifies what Alsswey and Malak (2024) described as data-driven decision-making in education.

Emotional and Professional Complexity

The dimension of Initial apprehension captures teachers' emotional vulnerability during technology integration. The teacher's fears about looking "stupid in front of students" or technical failures represent common implementation barriers that Leavitt (2023) addressed when discussing Kahoot's accessibility and ease of use for educators at various comfort levels with technology.

Gradual confidence building illustrates the emotional progression that accompanies successful implementation. The teacher's reflection about feeling "like a Kahoot expert" by week three demonstrates the confidence-building process that Garza et al. (2023) described when discussing how educators adapt to digital quiz platforms over time.

The Pride in student performance improvements dimension highlights the emotional rewards of successful technology integration. This emotional response aligns with Özdemir's (2025) research highlighting Kahoot's positive impact on both student learning outcomes and teacher motivation, creating a positive feedback loop that reinforces continued use.

Finally, *Professional self-reflection* demonstrates how technology implementation can prompt deeper pedagogical introspection. The teacher's wonder about "what other new tools might help my students" reflects the broader professional growth that Montenegro-Rueda et al. (2023) identified when examining how digital tools encourage teachers to reconsider and enhance their instructional practices.

These dimensions align with current research emphasizing how Kahoot has revolutionized education through

gamified learning experiences, real-time assessment capabilities, accessibility across devices, and customization features. The teacher's journey mirrors the literature's findings on Kahoot's capacity to transform mathematics instruction by enhancing student engagement, providing immediate feedback, fostering inclusive participation, offering versatility in use, and generating valuable data-driven insights for instructional improvement.

CONCLUSION

In conclusion, the data provides compelling evidence that the intervention significantly improved test scores with a large practical effect. While individual variability in responses warrants further investigation, the consistency of the mean difference and effect size underscores the intervention's overall efficacy. These findings advocate for its continued use, paired with efforts to optimize implementation strategies and address unanswered questions about differential effectiveness across contexts or individuals.

Limitations

Despite these robust findings, the weak pre-post correlation raises questions about heterogeneity in intervention effects. Participants may have responded differently based on unmeasured variables, such as prior knowledge, motivation, or contextual factors. Additionally, the analysis does not account for potential confounders like time elapsed between tests or environmental influences, which limit causal inferences.

RECOMMENDATIONS

The findings prompted several strategic recommendations for advancing this promising intervention. Future research directions included exploring effect moderators, investigating demographic-specific effectiveness, developing mixed-methods approaches, conducting replication studies in diverse populations, and enhancing understanding of implementation fidelity. Strategic next steps emphasize refined implementation protocols, comprehensive contextual analysis, and continuous method optimization.

These recommendations aimed to build upon the intervention's demonstrated effectiveness while acknowledging the complexity of educational environments and the need for tailored approaches. By pursuing these directions, subsequent research could further validate and extend the intervention's impact across varied educational settings and student populations.

REFERENCES

1. Alsswey, A., & Malak, M. Z. (2024). Effect of using gamification of "Kahoot!" as a learning method on stress symptoms, anxiety symptoms, self-efficacy, and academic achievement among university students. Learning and Motivation, 87(2024). https://www.sciencedirect.com/science/article/abs/pii/S0023969024000353
2. Barragán-Pulido, S., Barragán-Pulido, M. L., Alonso-Hernández, J. B., Castro-Sánchez, J. J., & Rabazo-Méndez, M. J. (2023). Development of Students' Skills through Gamification and Serious Games: An Exploratory Study. Applied Sciences, 13(9), 5495. https://doi.org/10.3390/app13095495
3. Barraza, C. (2023). 12 Advantages and Disadvantages of Kahoot. Retrieved from https://barrazacarlos.com/advantages-and-disadvantages-of-kahoot/
4. Garza, M., Olivan, S., Monleón, E., et al. (2023). Performance in Kahoot! activities as predictive of exam performance. BMC Medical Education, 23(413). https://doi.org/10.1186/s12909-023-04379-x
5. Harris, H. (2024). Kahoot! | Teacher Takeover: The Kahoot! Cup 2024 takes the global stage. Retrieved from https://kahoot.com/blog/2024/12/13/kahootcup-2024-recap/
6. Kucirkova, N. (2024). Kahoot! improves student learning outcomes and mental well-being. Retrieved from https://kahoot.com/blog/2025/01/15/new-research-kahoot-improves-learning-outcomes-retention-motivation/
7. Kwon, K., Shin, S., & Jung, J. (2022). Collaborative learning in the flipped university classroom: Identifying team process factors. Sustainability, 14(12), 7173. https://doi.org/10.3390/su14127173
8. Leavitt, E. (2023). Why Is Kahoot Good for Students. Retrieved from https://robots.net/tech/why-

is-kahoot-good-for-students/
9. Montenegro-Rueda, M., Fernández-Cerero, J., Mena-Guacas, A. F., & Reyes-Rebollo, M. M. (2023). Impact of Gamified Teaching on University Student Learning. Education Sciences, 13(5), 470. https://doi.org/10.3390/educsci13050470
10. Özdemir, O. (2025). Kahoot! Game-based digital learning platform: A comprehensive meta-analysis. Journal of Computer Assisted Learning. https://tinyurl.com/yupdxam4
11. Shawwa, L., & Kamel, F. (2023). Assessing the Knowledge and Perceptions of Medical Students After Using Kahoot! in Pharmacology Practical Sessions at King Abdulaziz University, Jeddah. Cureus, 15(3), e36796. https://doi.org/10.7759/cureus.36796
12. Wang, A. I., & Tahir, R. (2020). Dozens of studies show learning benefits of using Kahoot. Retrieved from https://kahoot.com/blog/2020/07/01/dozens-of-studies-show-learning-benefits-of-kahoot/
13. WiKIT. (2024). Kahoot! has a strong positive impact on students' learning outcomes. Retrieved from https://www.educationbusinesstechnology.com/kahoot-has-a-strong-positive-impact-on-students-learning-outcomes-shows-new-research/

APPENDIX A

Table of Specification

Learning Competency	Cognitive Level	Item Placement	Total Items
determines the relationship of the volume between a rectangular prism and a pyramid; a cylinder and a cone; and a cylinder and sphere.	Understanding	1	1
finds the volume of cylinders, pyramids, cones, and spheres.	Applying	2	1
solves routine and non-routine problems involving volumes of solids.	Analyzing	3	1
reads and interprets electric and water meter readings.	Understanding	4	1
solves routine and non-routine problems involving electric and water consumption.	Applying	5,6	2
constructs a pie graph based on a given set of data.	Creating	7	1
interprets data presented in a pie graph	Understanding	8	1
solves routine and non-routine problems using data presented in a pie graph.	Applying	9	1
describes the meaning of probability such as 50% chance of rain and one in a million chance of winning.	Understanding	10	1
performs experiments and records outcomes.	Applying	11	1
makes listings and diagrams of outcomes and tells the number of favorable outcomes and chances using these listings and diagrams.	Analyzing	12	1
makes simple predictions of events based on the results of experiments.	Evaluating	13	1
solves routine and non-routine problems involving experimental probability.	Applying	14	1
solves routine and non-routine problems involving theoretical probability.	Analyzing	15	1

Prepared by:

NELSON S. LUBGUBAN, JR.

LORENZO A. BALILI, JR.

DR. JOHN MART ELESIO

Researchers

Validated by:

MARNA MAE S. ASOMBRADO	**ANITA P. FEROLINO**
Math Teacher	Math Master Teacher

Appendix B

Pre-Test and Posttest Tool

Directions: Choose the letter of the best answer. Write your answer on your answer sheet.

1. Which relationship is TRUE about the volumes of 3D shapes with the same base and height?

a) A pyramid's volume is half of a rectangular prism's volume

b) A cone's volume is one-fourth of a cylinder's volume

c) A sphere's volume is equal to a cylinder's volume

d) A cone's volume is one-third of a cylinder's volume

2. A sphere has a radius of 3 meters. What is its volume? (Use $\pi = 3.14$)

a) 113.04 cubic meters

b) 37.68 cubic meters

c) 75.36 cubic meters

d) 226.08 cubic meters

3. A cylindrical water tank needs to be replaced with a conical tank of the same height and base radius. If the cylindrical tank holds 300 liters, how many conical tanks are needed to store the same amount of water?

a) 2 tanks c) 4 tanks

b) 3 tanks d) 6 tanks

For item 4, look at these meter readings:

Electric meter: Previous - 5342 kWh, Current - 5567 kWh

Water meter: Previous - 1234 cu.m., Current - 1298 cu.m.

4. What is the water consumption?

a) 54 cubic meters c) 74 cubic meters

b) 64 cubic meters d) 84 cubic meters

5. Using the readings from question 4, if electricity costs ₱10.50 per kWh, what is the electricity bill?

a) ₱2,362.50 c) ₱2,362.75

b) ₱2,512.50 d) ₱2,512.75

6. The Santos family's water consumption is 45 cubic meters. If the rate is ₱25 per cubic meter plus a fixed charge of ₱150, what is their total bill?

a) ₱1,125 c) ₱1,375

b) ₱1,275 d) ₱1,425

7. In a class of 40 students, 10 prefer reading, 15 prefer sports, 8 prefer music, and 7 prefer art. What angle should be used to represent sports in a pie graph?

a) 90° c) 150°

b) 135° d) 180°

8. In this pie graph of students' favorite subjects, Math takes up 120°. What fraction of students chose Math as their favorite subject?

a) 1/4 c) 2/5

b) 1/3 d) 1/2

9. A pie graph shows how Juan spent his ₱500 allowance: Food 40%, Transportation 25%, School Supplies 20%, Savings 15%. How much did he spend on school supplies?

a) ₱75 c) ₱125

b) ₱100 d) ₱150

10. When a meteorologist says there's a "one in four chance" of rain tomorrow, this means:

a) It will rain for 6 hours tomorrow

b) It will definitely rain tomorrow

c) The probability of rain is 25%

d) It rained on 4 similar days

11. Maria flipped a coin 20 times and recorded: HTHTHHTTHHTHTTHHTHTH

How many times did she get heads?

a) 8 c) 10

b) 9 d) 11

12. In a standard deck of 52 cards, how many favorable outcomes are there for drawing a red card?

a) 13 c) 39

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue V May 2025

b) 26 d) 52

13. After rolling a die 60 times, a 6 appeared 12 times. Based on this experiment, what is the most reasonable prediction for getting a 6 in the next 30 rolls?

a) Exactly 6 times

b) Exactly 5 times

c) Around 5-6 times

d) Around 8-9 times

14. In an experiment, a spinner with equal sections of red, blue, and green was spun 30 times. If red appeared 8 times, blue 12 times, and green 10 times, what is the experimental probability of getting blue?

a) 0.27 c) 0.40

b) 0.33 d) 0.45

15. In a bag containing 5 red marbles, 3 blue marbles, and 2 green marbles, what is the theoretical probability of drawing a blue marble followed by a red marble without replacement?

a) 3/20 c) 15/100

b) 15/90 d) 5/18

Prepared by:

NELSON S. LUBGUBAN, JR.

LORENZO A. BALILI, JR.

DR. JOHN MART ELESIO

Researchers

Validated by:

MARNA MAE S. ASOMBRADO

Math Teacher

ANITA P. FEROLINO

Math Master Teacher