

Influence of a PowerPoint-based Game Strategy on the Academic Performance of Grade 7 Students in Nutrition

Gabriel Antonio T. Orjalesa

gabrieltamayo5588@gmail.com

Leyte Normal University, P. Paterno Street, Tacloban City, 6500 Leyte, Philippines

Abstract

This study examined the influence of a PowerPoint-based game strategy on the academic performance of Grade 7 students in Nutrition. It aimed to determine the students' academic performance before and after the implementation of the strategy and to identify whether a significant difference exists between pretest and posttest scores. The study employed a quantitative approach using a pre-experimental one-group pretest–posttest design. The participants consisted of one section of Grade 7 students selected through full enumeration sampling. A standardized test instrument aligned with the Department of Education's Most Essential Learning Competencies (MELCs) in Health was used to measure academic performance. Data were collected through the administration of a 15-item pretest and posttest. The intervention involved the use of a PowerPoint-based game strategy implemented across four instructional sessions, with lessons focusing on key Nutrition topics. Descriptive statistics, including mean and Mean Percentage Score (MPS), and inferential statistics using a paired-samples t-test were used to analyze the data. Results showed an increase in performance from a pretest mean score of 8.82 (*MPS = 58.80%, Low*) to a posttest mean score of 13.44 (*MPS = 89.60%, High*). A statistically significant difference was found between pretest and posttest scores ($p < .001$), indicating higher performance after the implementation of the strategy. The findings suggest that the PowerPoint-based game strategy may have a positive influence on students' academic performance and engagement in Nutrition. Further studies are recommended to explore its application using more rigorous research designs.

Keywords: PowerPoint-based game; academic performance; Nutrition; pretest-posttest; Grade 7 students

1. Introduction

Students' academic performance is often affected when classroom instruction is perceived as boring, repetitive, or disconnected from their interests and experiences. According to Ainley and Hidi (2002), students are more likely to disengage from learning activities when lessons fail to capture their interest or relate to their personal experiences. Similarly, Hidi and Harackiewicz (2000) explained that students tend to lose motivation when instructional tasks are viewed as difficult, monotonous, or uninteresting. In support, Shernoff et al. (2016) found that students who experience low classroom engagement often demonstrate reduced participation, persistence, and academic performance. These findings suggest the need for more engaging and learner-centered instructional approaches that encourage active participation in classroom learning. One instructional approach that has gained increasing attention in education is game-based learning. Studies have shown that game-based learning creates interactive learning environments that improve student engagement, motivation, and academic performance (Gee, 2003; Plass et al., 2015; Adipat et al., 2021). According to Prensky (2001), modern learners are more responsive to technology-based and interactive instructional activities compared to traditional lecture-centered approaches. Likewise, Papastergiou (2009) found that integrating educational games into classroom instruction significantly improved both students' motivation and academic achievement. Educational games also encourage active participation, immediate feedback, problem-solving, and collaboration, which are considered important components of meaningful learning (Gee, 2007; Hamari et al., 2014; Charsky, 2010).

In the Philippine educational setting, game-based learning has also been recognized as a useful instructional approach. Studies conducted in the Philippines revealed that students show greater interest and participation when game-based strategies are incorporated into classroom instruction (Almonte & Andal, 2023; Ramirez et al., 2010). Vate-U-Lan (2015) and Lozano et al. (2023) further noted that integrating games into lessons may improve students' learning experiences and classroom engagement. These findings indicate that game-based instructional approaches may serve as effective alternatives to traditional teaching methods, particularly in subjects that require active student participation and understanding. Among the four components of MAPEH, Health was selected as the focus of this study because it is considered more knowledge-based compared to Music, Arts, and Physical Education, which are generally more skill-based and performance-oriented. Health lessons are often delivered through teacher-centered instruction, which may reduce students' engagement and participation during classroom discussions. Because of this, the researcher utilized a PowerPoint-based game strategy in teaching Nutrition to create a more interactive and student-centered learning environment. The topic Nutrition was considered appropriate for this approach because it involves concepts that

can be reinforced through engaging classroom activities and educational games.

Despite the growing number of studies on game-based learning, limited research has focused on the use of PowerPoint-based game strategies in teaching Nutrition under the Health component of MAPEH among Grade 7 students in the Philippine context. Most existing studies concentrated on subjects such as Mathematics, Science, or Physical Education, while fewer studies examined the application of game-based learning in Health education. This gap highlights the need to explore how PowerPoint-based game strategies may influence students' academic performance in Nutrition. Therefore, this study examined the influence of a PowerPoint-based game strategy on the academic performance of Grade 7 students in Nutrition by determining the students' pretest mean scores before the implementation of the intervention, their posttest mean scores after the implementation of the PowerPoint-based game strategy, and whether a significant difference existed between the pretest and posttest mean scores.

2. Methodology

2.1 Research Design

This study employed a quantitative pre-experimental research design using a one-group pretest-posttest design to determine the influence of a PowerPoint-based game strategy on the academic performance of Grade 7 students in Nutrition. A single group of Grade 7 students from a private junior high school in Tacloban City was assessed before and after the intervention to measure changes in learning outcomes. The intervention consisted of a PowerPoint-based game activity integrated into Nutrition lessons and was implemented across four class sessions lasting approximately 45–50 minutes each during the fourth grading period. Students completed a pretest before the intervention and a posttest after the intervention using standardized assessment tools adopted from a Grade 7 Health test bank developed by the Department of Education (DepEd). This design enabled the researcher to examine changes in students' academic performance following exposure to the instructional strategy.

2.2 Research Locale

The study was conducted in a private Junior High School in Tacloban City, Philippines. The school offers a junior high school program and provides a setting for regular classroom instruction. The locale was selected because it provided access to the target participants needed for the study. It also allowed the researcher to efficiently collect the necessary data and implement the PowerPoint-based Game Strategy during regular class sessions. Moreover, the school provided a suitable setting for examining the influence of the intervention on students' academic performance in Nutrition.

2.3 Research Respondents

The respondents of the study were one section of Grade 7 students from a Junior High school in Tacloban City. All students enrolled in the selected section participated in the intervention. Respondents were included in the study if they: (a) were officially enrolled in MAPEH 7, (b) were between 12 to 13 years old, and (c) voluntarily agreed to participate with assent and parental consent, where applicable. Students were excluded from the study if they: (a) were absent during either the pretest or posttest, (b) submitted incomplete test responses, (c) failed to return signed parental consent forms, or (d) voluntarily withdrew during the conduct of the study.

2.4 Research Instrument

The study utilized standardized pretest and posttest questionnaires adopted from a Grade 7 Health test bank developed by the Department of Education (DepEd). The instruments were aligned with the Most Essential Learning Competencies (MELCs) for Grade 7 Health, specifically on the topic of Nutrition. Two equivalent sets of test items were used for the pretest and posttest, with both based on the same competencies, lesson content, and level of difficulty. Each test consisted of 15 multiple-choice items designed to measure students' academic performance in Nutrition. An open-ended feedback form was also administered to gather students' experiences and suggestions regarding the PowerPoint-based game activity.

2.5 Data Gathering Procedure

Prior to data collection, the researcher secured approval from the school administration and obtained informed consent from parents or guardians, as well as assent from student participants. A pretest was administered to establish the students' baseline academic performance in Nutrition. The PowerPoint-based game strategy was then implemented during four instructional sessions, each lasting approximately 45–50 minutes, under the supervision of the MAPEH teacher. After the intervention, a posttest was administered to determine changes in students' academic performance. Students also completed an open-ended feedback form, and all responses were collected and prepared for analysis.

2.6 Statistical Treatment of Data

Descriptive and inferential statistical tools were used to analyze the data gathered in the study. Mean and Mean Percentage Score (MPS) were computed to describe students' academic performance before and after the intervention. A paired sample t-test was employed to determine whether a significant difference existed between the pretest and posttest mean scores. Quantitative data were encoded and analyzed using Jamovi statistical software. Responses from the open-ended feedback form were analyzed thematically to provide supplementary insights regarding students' experiences with the intervention.

2.7 Ethical Considerations

The researcher adhered to ethical standards to protect the rights, dignity, and welfare of all participants throughout the study. Permission from the school administration, informed consent from parents or guardians, and assent from student participants were secured prior to data collection. Participation was voluntary, and students were informed of their right to withdraw from the study at any time without penalty. Confidentiality and anonymity were maintained by assigning numerical codes and handling all data in accordance with the Data Privacy Act of 2012. The study posed minimal risk to participants, and their identities remained confidential in all reports and publications.

3. Results and Discussion

The influence of the PowerPoint-based Game Strategy in improving the Nutrition knowledge of Grade 7 students was determined through pretest and posttest assessments administered to 45 participants.

3.1 Academic Performance of Grade 7 Students before Intervention

Table 1. Academic Performance before Intervention

	M	MPS	SD	Interpretation
Academic Performance (Pre-test)	8.82	58.80%	2.90	Low

MPS Interpretations: below 75% (Low), 75–84% (Average), 85–89% (High), and 90–100% (Very High)

Table 1 shows that the students obtained a mean score of 8.82 with an MPS of 58.80%, interpreted as Low, and a standard deviation of 2.90. This indicates that before the implementation of the PowerPoint-based game strategy, the students had relatively low academic performance in Nutrition. The low MPS suggests that most students had limited understanding of the basic concepts in Nutrition prior to the intervention. The higher standard deviation also indicates that students' scores were somewhat varied, showing differences in their prior knowledge levels. The results highlight the need for a more engaging and interactive instructional approach, as the students may have required additional instructional support to improve their understanding of the topic. This result provided justification for introducing the PowerPoint-based game strategy as an intervention aimed at improving students' academic performance in Nutrition. The findings support Ausubel's Theory of Meaningful Learning, which explains that prior knowledge plays an important role in the acquisition of new concepts because learners understand information more effectively when it is connected to their existing cognitive structure (Ausubel, 1968). Similarly, Prince (2004) emphasized that students learn more effectively when they are actively engaged in the learning process rather than passively receiving information. In addition, Mayer (2009) explained that meaningful learning is enhanced when instructional materials use visual and interactive elements that support understanding and retention.

3.2 Academic Performance of Grade 7 Students after Intervention

Table 2. Academic Performance after Intervention

	M	MPS	SD	Interpretation
Academic Performance (Post-test)	13.44	89.60%	1.42	High

MPS Interpretations: below 75% (Low), 75–84% (Average), 85–89% (High), and 90–100% (Very High)

Table 2 shows that the students obtained a mean score of 13.44 with an MPS of 89.60%, interpreted as High, and a standard deviation of 1.42. This indicates that after the implementation of the PowerPoint-based game strategy, students demonstrated improved academic performance in Nutrition. The substantial increase in mean score and MPS suggests that the students gained a better understanding of the lesson concepts. The lower

standard deviation compared to the pretest also indicates that students' scores became more consistent after the intervention. These results suggest that the PowerPoint-based game strategy may have contributed to improving students' understanding of Nutrition concepts. The increase in performance indicates that integrating game-based activities into instruction may support students' learning and academic achievement. The improved and more consistent scores also suggest that interactive learning strategies may help learners develop a better understanding of lesson content. These findings are consistent with Gee (2003), who stated that game-based learning environments promote active participation, motivation, problem-solving, and immediate feedback, all of which contribute to improved learning outcomes. Likewise, Mayer's Cognitive Theory of Multimedia Learning (2009) explains that students learn more effectively when information is presented through visual and verbal formats that help organize and process knowledge efficiently. In addition, Papastergiou (2009) found that integrating educational games into classroom instruction significantly improves students' motivation and academic achievement.

3.3 Significant Difference Between the Academic Performance of the Students Before and After the Intervention

The Shapiro–Wilk test was conducted to assess the normality of the paired scores before performing the paired samples t-test. Results revealed that the data did not significantly deviate from normality, $W = 0.953$, $p = .066$. Since the p-value was greater than the 0.05 level of significance, the assumption of normality was met; therefore, the paired samples t-test was deemed appropriate for analyzing the significant difference between pretest and posttest scores.

Table 3. Academic Performance of the Students Before and After the Intervention

		Statistic	df	p	Effect Size	
Pre-test	Post-test	Student's t	-10.7	44.0	<.001	Cohen's d 1.59

The paired samples t-test revealed a statistically significant difference between the pretest and posttest scores of the students, $t(44) = -10.7$, $p < .001$. Since the p-value is lower than the 0.05 level of significance, this indicates that students' academic performance in Nutrition significantly improved after the implementation of the PowerPoint-based game strategy. The negative t-value simply shows that posttest scores were higher than pretest scores when the difference was computed from pretest to posttest. Furthermore, the effect size (Cohen's $d = 1.59$) indicates a very large effect, suggesting that the intervention produced a substantial improvement in student learning. This also suggests that the intervention had practical significance in improving student performance in classroom instruction. The significant increase in scores suggests that the PowerPoint-based game strategy may have contributed to improving students' understanding of Nutrition concepts. This implies that integrating interactive and game-based instructional strategies may support better learning outcomes and student-centered learning in Health education. The findings also support previous studies which reported that game-based learning improves academic performance by increasing student motivation, active participation, and engagement in classroom instruction (Gee, 2003; Papastergiou, 2009; Plass et al., 2015). Hamari et al. (2014) also found that gamification can positively influence learning outcomes when appropriately integrated into instruction. The present result is consistent with these studies, suggesting that classroom-based game strategies, such as PowerPoint-based games, may contribute to meaningful learning gains among students.

3.4 Educational Implications of the Study

The findings of this study provide important implications for classroom instruction, particularly in teaching Health Education among Grade 7 students. The significant improvement in students' posttest scores suggests that the PowerPoint-based Game Strategy can be used as an effective instructional approach in teaching Nutrition concepts. First, the study highlights the value of integrating interactive and game-based learning strategies into classroom instruction. Traditional lecture-based approaches may not always sustain students' interest; however, game-based activities incorporated into multimedia presentations may increase student engagement, participation, and motivation to learn. Second, the findings suggest that PowerPoint, when creatively designed as an instructional game tool, can function as more than a presentation aid. It may serve as an interactive learning material that promotes active recall, reinforcement of concepts, and immediate feedback, which are important factors in improving academic performance. Third, the results imply that teachers in MAPEH and other subject areas may adopt similar technology-assisted instructional strategies to make learning more learner-centered and enjoyable. This supports the Department of Education's emphasis on innovative teaching practices that aim to improve student learning outcomes. Furthermore, the study demonstrates that a PowerPoint-based Game Strategy can be a practical, accessible, and effective instructional intervention that

teachers may integrate into classroom instruction to enhance students' understanding of Nutrition concepts.

3.5 Limitations of the Study

This study was limited to Grade 7 students from one junior high school, which may affect the generalizability of the findings to other educational contexts. The study also employed a one-group pretest-posttest research design without a control group, limiting the comparison of results with other instructional approaches. In addition, the intervention was conducted within a limited period and focused only on Nutrition concepts in Health Education. Other factors that may have influenced students' academic performance, such as individual learning differences, classroom environment, and prior exposure to the lesson content, were not controlled in the study.

4. Conclusion

Based on the findings of the study, Grade 7 students obtained a pretest mean score of 8.82 with a Mean Percentage Score (MPS) of 58.80%, interpreted as Low, indicating limited prior knowledge and understanding of Nutrition concepts before the implementation of the PowerPoint-based Game Strategy. After the intervention, the students achieved a posttest mean score of 13.44 with an MPS of 89.60%, interpreted as High, reflecting improved academic performance and better understanding of the lesson. Statistical analysis using the paired samples t-test revealed a significant difference between the pretest and posttest scores, $t(44) = -10.7$, $p < .001$, with a large effect size (Cohen's $d = 1.59$), indicating that students performed significantly better after the implementation of the intervention. Therefore, the study concludes that the PowerPoint-based Game Strategy contributed to the improvement of Grade 7 students' academic performance in Nutrition. The findings suggest that integrating game-based and technology-assisted instructional strategies into classroom teaching may enhance student engagement and support improved learning outcomes in Health Education.

5. Recommendations

Based on the findings of the study, the following recommendations are proposed. Teachers are encouraged to integrate PowerPoint-based game strategies in Health instruction to enhance student engagement, participation, and understanding of Nutrition concepts. The use of interactive and game-based activities can serve as a supplementary instructional approach in delivering knowledge-based lessons. Schools and educational institutions may support innovative instructional practices by providing technological resources, teacher training, and professional development opportunities that strengthen teachers' ability to integrate game-based learning strategies in classroom instruction. Curriculum developers are encouraged to incorporate structured interactive learning activities into instructional materials to promote more student-centered teaching approaches in Health Education and related subject areas. Future researchers are recommended to conduct similar studies using longer intervention periods, larger sample sizes, control groups, or different learning areas to further examine the long-term effectiveness and broader applicability of PowerPoint-based game strategies.

Acknowledgements

The researcher expresses sincere gratitude to all individuals and institutions who contributed to the successful completion of this study. Special thanks are extended to Dr. Maricar C. Tegero, research adviser, for her guidance, support, and valuable insights throughout the conduct of the study; Dr. Fabiana P. Peñeda, research instructor; Mr. Renz Orville P. Caidoy, head of the research panel; and Ms. Majejan Placigo for their constructive suggestions and assistance in improving this research. The researcher also extends appreciation to the Grade 7 student respondents for their participation, and to RWP 200 (Research Writing and Publication) for providing the opportunity to develop, conduct, and experience the process of academic research and publication. The researcher likewise expresses gratitude to Leyte Normal University, particularly the Office of the Graduate School, Dr. Gil Nicetas B. Villarino, University President, and Dr. Cleofe L. Lajara, Dean of the Graduate School, for their continued support in promoting academic research. Above all, the researcher gives thanks to Almighty God for wisdom, strength, and guidance throughout this academic journey.

A.I Acknowledgements

The researcher further acknowledges the use of ChatGPT by OpenAI as a supplementary academic support tool for language refinement, organization, and formatting assistance during the preparation of this manuscript. All generated outputs were carefully reviewed, revised, and validated by the researcher to ensure the accuracy, originality, and integrity of the study.

References

- Adipat, S., Laksana, K., Busayanon, K., Ausawasowan, A., & Adipat, B. (2021). Engaging Students in the Learning Process with Game-Based Learning: The Fundamental Concepts. *International Journal of Technology in Education*, 4(3), 542–552. <https://doi.org/10.46328/ijte.169>
- Ainley, M., & Hidi, S. (2002). Interest and motivation in learning. In R. Colwell & C. Richardson (Eds.), *The new handbook of research on music teaching and learning* (pp. 385–401). Oxford University Press.
- Almonte, R. R., & Andal, Z. (2023). Integrating Indigenous Game-Based Activity in Promoting Interactive Learning Development among Grade 10 Students. *International Journal of Social Science Humanity & Management Research*, 2(06). <https://doi.org/10.58806/ijsshr.2023.v2i6n09>
- Ausubel, D. P. (1968). *Educational psychology: A cognitive view*. Holt, Rinehart and Winston.
- Charsky, D. (2010). From edutainment to serious games: A change in the use of game characteristics. *Games and Culture*, 5(2), 177–198. <https://doi.org/10.1177/1555412009354727>
- Department of Education. (2015). Policy guidelines on classroom assessment for the K to 12 Basic Education Program (DepEd Order No. 8, s. 2015). <https://www.deped.gov.ph/2015/04/01/do-8-s-2015-policy-guidelines-on-classroom-assessment-for-the-k-to-12-basic-education-program/>
- Gee, J. P. (2003). *What video games have to teach us about learning and literacy*. Palgrave Macmillan.
- Gee, J. P. (2007). *What video games have to teach us about learning and literacy* (2nd ed.). Palgrave Macmillan.
- Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work? – A literature review of empirical studies on gamification. *Proceedings of the 47th Hawaii International Conference on System Sciences*, 3025–3034. <https://doi.org/10.1109/HICSS.2014.377>
- Hidi, S., & Harackiewicz, J. M. (2000). Motivating the Academically Unmotivated: A Critical Issue for the 21st Century. *Review of Educational Research*, 70(2), 151–179. <https://doi.org/10.3102/00346543070002151>
- Lozano, A. S., Justine, Coronel, K. M., Canlas, J. M., Duya, Jerico G, Macapagal, R. C., Dungca, E. M., & John, M. (2023). A Game-Based Learning Application to Help Learners to Practice Mathematical Patterns and Structures. 7, 2212–2226. <https://doi.org/10.25147/ijcsr.2017.001.1.156>
- Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press.
- Papastergiou, M. (2009). Digital game-based learning in high school computer science education: Impact on educational effectiveness and student motivation. *Computers & Education*, 52(1), 1–12. <https://doi.org/10.1016/j.compedu.2008.06.004>
- Plass, J. L., Homer, B. D., & Kinzer, C. K. (2015). Foundations of game-based learning. *Educational Psychologist*, 50(4), 258–283. <https://doi.org/10.1080/00461520.2015.1122533>
- Prensky, M. (2001). *Digital game-based learning*. McGraw-Hill.
- Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education*, 93(3), 223–231. <https://doi.org/10.1002/j.2168-9830.2004.tb00809.x>
- Ramirez, C. G. R., Almonte, J. B., Tugade, R. R., & Atienza, R. O. (2010). Implementation of a digital game-based learning environment for elementary Education. 2010 2nd International Conference on Education Technology and Computer. <https://doi.org/10.1109/icetc.2010.5529699>
- Shermoff, D. J., Sannella, A. J., Schorr, R. Y., Sanchez-Wall, L., Ruzek, E., & Bressler, D. M. (2016). Separate worlds: The influence of seating location on student engagement, classroom experience, and performance in the middle school mathematics classroom. *Learning Environments Research*, 19(3), 433–458. <https://doi.org/10.1007/s10984-016-9212-y>
- Vate-U-Lan, P. (2015). Transforming Classrooms through Game-Based Learning. *International Journal of Game-Based Learning*, 5(1), 46–57. <https://doi.org/10.4018/ijgbl.2015010104>