

Game-Based Learning On Technology And Livelihood Education Among Grade 7 Students Of Lumbang INHS

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Abstract

This research study investigates the prospect of game-based learning as a new and student-centered pedagogy in the Grade 7 Technology and Livelihood Education (TLE) curriculum of Lumbang Integrated National High School. The research aims to distinguish game-based learning from pedagogical techniques in terms of cognitive, manipulative, and affective nature of learning, especially in how games help enhance knowledge retention, skill mastery, and emotional engagement; thus, how game-based learning affects the engagement and motivation of students in terms of interest level, effectiveness of rewards or other motivating factors, and the impact of their teacher's facilitation style in promoting active involvement.

In addition, the study aims to identify the constraints that the students and teachers face in effectively embracing game-based learning, including resources, time, and readiness of the teacher's constraints. Through result analysis, the research seeks to prescribe specific improvement projects that will allow efficient integration of game-based approaches in the TLE classroom. In the end, this research seeks to further enhance instructional processes in TLE through the generation of real-world insights that advocate for a more participatory, engaging, and meaningful learning experience for junior high school students.

Keywords: *Game-based learning, knowledge retention, skill mastery, efficient integration, instructional process, Technology and Livelihood Education*

Introduction

Game-based learning (GBL) integrates interactive games into instruction to boost engagement in skill-based subjects like TLE, addressing issues of disinterest and poor retention in traditional methods. At Lumbang INHS, Grade 7 students struggle with applying TLE concepts practically, prompting this study aligned with DepEd policies like Order No. 21, s. 2019, for innovative, contextualized teaching.

This study seeks to answer the questions:

1. What are the features of game-based learning in the cognitive, manipulative, and affective domains?
2. How does game-based learning influence the motivation and engagement of students in terms of level of interest, effectiveness of rewards or other motivating factors, and the impact of teachers' facilitation style in promoting active involvement?
3. What constraints do students and teachers face in effectively implementing game-based learning, including resources, time, and teacher readiness?
4. What improvement projects can be proposed for the efficient integration of game-based approaches in the TLE classroom?

Methodology

Research Design

This action research employed a quantitative quasi-experimental pretest-posttest control group design to assess the impact of game-based learning (GBL) on cognitive, manipulative, and affective domains in Grade 7 Technology and Livelihood Education (TLE) at Lumbang Integrated National High School (INHS). The design compared an experimental group receiving GBL interventions against a control group using traditional instruction, with pre- and post-intervention assessments to measure gains in student engagement, motivation, and skill acquisition. Random assignment was not feasible due to intact class structures, but equivalence was ensured through baseline pretest comparisons and standardized TLE content delivery.

Participants

The study involved 90 Grade 7 students from Lumbang INHS during the 2024-2025 school year, equally divided into experimental (n=45) and control (n=45) groups selected via purposive sampling from two intact sections handling the same TLE competencies. Participants were aged 12-14, with similar demographics (60% male, 40% female; rural socioeconomic background), and represented typical public junior high learners with limited prior exposure to digital GBL tools. Three TLE teachers and the school principal provided validation input, while parental consent was secured for all student participants.

Research Instrument

A researcher-developed survey questionnaire used a 4-point Likert scale (4=Strongly Agree, 3=Agree, 2=Disagree, 1=Strongly Disagree) to evaluate GBL effects across three domains: cognitive (e.g., concept retention, critical thinking), manipulative (e.g., tool handling,

procedural accuracy), and affective (e.g., motivation, enjoyment, cooperation). Additional sections covered motivation/engagement factors (interest levels, rewards effectiveness, teacher facilitation) and implementation constraints (resources, time, readiness). The instrument, comprising 25-30 items per domain, was content-validated by three TLE experts and school validators (Mr. Randy F. Falculan, Mr. Jonathan R. Carandang, Mrs. Jennifer M. Mea), achieving high reliability aligned with Most Essential Learning Competencies (MELCs) for Grade 7 TLE.

Data Collection Procedure

Following approval from the school principal and informed consent from parents/students, a pretest was administered to both groups prior to the 4-6 week intervention period. The experimental group engaged in GBL activities (e.g., simulations for cooking/carpentry, Kahoot!-style quizzes, team challenges) integrated into TLE lessons, while the control group followed standard lecture-demonstration methods. Posttests and supplementary observations were conducted immediately after, using Google Forms for digital administration to ensure accessibility in a resource-limited setting. Ethical protocols adhered to DepEd guidelines and RA 10173 for data privacy.

Data Analysis

Descriptive statistics—including weighted means (WM), composite means, rankings, and verbal interpretations (Strongly Agree: 3.50-4.49; Agree: 2.50-3.49)—summarized Likert responses across domains and factors. Pre/post mean differences were analyzed to gauge GBL effectiveness, with tables presenting key indicators (e.g., WM for tool handling: 3.51). Inferential tests, if applied, would compare group gains, though primary emphasis rested on practical significance for classroom action recommendations.

Results

Below are the formulated questions that the researcher sought to answer as well as the analysis of results and its discussion.

Table 1
Cognitive Domain (Knowledge and Thinking Skills) – Game-Based Learning Feature

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Retention of important concepts	3.61	Strongly Agree	1
2. Clarity in understanding lessons	3.49	Agree	3
3. Application of knowledge to real tasks	3.43	Agree	4
4. Critical thinking enhancement	3.55	Strongly Agree	2
5. Improved problem-solving skills	3.39	Agree	5
COMPOSITE MEAN	3.49	Agree	
<i>Verbal Interpretation Strongly Agree (3.50-4.49); Agree (2.50-3.49); Disagree (1.50-2.49); Strongly Disagree (1.00-1.49).</i>			

Tables 1 exhibit the strong responses given by the students in terms of agreement on retention of key concepts (3.61) and enhancement of critical thinking (3.55), being the two most favorably positive aspects of the game-based learning intervention while an improved problem-solving ability (3.46) was the least consensus one.

This showed that the students gained confidence in remembering key concepts, thinking critically, and still had some challenges while applying those abilities in the problem-solving activity. The highest scores might be due to the interactive process of learning through games, allowing active response and greater memorization, while problem-solving ability might require more practice and guidance following first exposure. The lower score in problem-solving might be due to the delicacy of these skills that would require more specialized exercises to become better. In addition, Lee et al. (2020) highlighted that although game-based methods increase overall comprehension, problem-solving capability must be fostered with long-term and focused facilitation of instruction. The 3.49 weighted mean accounts for the positive effect of game-based learning on performance of the students in TLE and thus warranting its effectiveness in knowledge retention acquisition as well as in higher-order thinking.

Table 2
Manipulative Domain (Practical and Physical Skills) – Game -Based Learning Features

Indicators	Weighted Mean	Interpretation	Rank
1. Proper handling of tools and materials during the games	3.51	Strongly Agree	1
2. Improvement of physical/practical skills through the games	3.46	Agree	4
3. Correct following of steps and procedures during the games	3.43	Agree	5
4. Increased confidence in performing hands-on tasks	3.47	Agree	3
5. Practice of real-life TLE skills through the games	3.50	Agree	2
COMPOSITE MEAN	3.47	Agree	
<i>Verbal Interpretation Strongly Agree (3.50-4.49); Agree (2.50-3.49); Disagree (1.50-2.49); Strongly Disagree (1.00-1.49).</i>			

Table 2 shows that majority of the respondents strongly agreed that game-based learning significantly impacted them in appropriate handling of equipment and materials, which received the highest weighted mean of 3.51. The respondents agreed that the games enabled them to simulate actual TLE skills (3.50) and boosted their confidence to undertake hands-on activities (3.47). Development of physical/practical skills (3.46) and rigid adherence to steps and procedure (3.43) were also viewed positively, but lower down the rank. This indicates that students were most relaxed and at ease when using tools in hand and utilizing practical skills and sticking closely to exact procedures was only marginally more difficult. Yet, there is some uncertainty as to whether this particularity works the way it does, for example in motivating meaning to kinesthetic learning, allowing students to be confident and at an arms' length (because they cause some students a lot of strain).

Studies have validated game-based learning (GBL) as beneficial for developing manipulative skills in learners, more significantly in technical vocational education. GBL makes experiential learning by making the learners experience tools and re-create real operations within a safe and motivating environment. Alsubaie et al. (2021) contended that game-based learning enhances the learners' effective manipulation of materials as well as their psychomotor skills through repeated and purposive practice. Similarly, Wahab and Mustapha (2020) found that GBL significantly improves learners' confidence and ability to perform hands-on tasks, particularly in subjects like Technology and Livelihood Education (TLE), where accurate procedure and handling of

materials are relevant. Moreover, the kinesthetic engagement of games facilitates learners to learn step-by-step procedures more easily than in normal lectures. Whereas confidence and skill development were front and center, procedural fidelity also relies on the organization and structure of the games themselves, therefore why it would be a hair behind in student feedback.

Table 3
Affective Domain (Attitudes, Values, and Emotions) – Game-Based Learning Features

Indicator	Weighted Mean	Interpretation	Rank
1. Increased motivation to learn during game-based activities	3.60	Strongly Agree	1
2. Greater enjoyment of learning TLE through games	3.55	Strongly Agree	3
3. More active participation in class during games	3.51	Strongly Agree	4
4. Positive attitude towards cooperating with classmates during game activities	3.58	Strongly Agree	2
5. Development of responsibility in completing tasks through games	3.49	Strongly Agree	5
COMPOSITE MEAN	3.55	Strongly Agree	
<i>Verbal Interpretation Strongly Agree (3.50-4.49); Agree (2.50-3.49); Disagree (1.50-2.49); Strongly Disagree (1.00-1.49).</i>			

Table 3 shows the participants highly agreed that studying through games significantly enhanced their learning motivation, as evidenced by the highest weighted mean of 3.60. The participants highly agreed that they acquired TLE more effectively using games (3.55) and appreciated working with their friends during game drills (3.58). Engaged participation in class (3.51) and taking responsibility in task fulfillment (3.49) were likewise affirmed positively although at lower rank.

This would suggest that students were most interested and motivated when they learned using games, which by default encouraged cooperation and enjoyment. The lower score in the development of responsibility may indicate that while students enjoyed the games, repeated completion of tasks needed additional reinforcement or guidance.

According to Kuo and Chuang (2022), game-based learning enhances learners' motivation,

engagement, and cooperation by creating emotionally engaging and interactive classroom experiences. Additionally, game-based learning has been proven to enhance motivation and positive classroom behavior through the stimulation of intrinsic motivation and support of an effective learning environment (Wang et al., 2019). Strongly agreeing (3.55) amongst themselves, the respondents affirmed that game-based activity can greatly enhance the academic involvement as well as social and personal development of Grade 7 TLE learners.

Table 4
Influence of Game-based Learning on the Motivation and Engagement of Grade 7 Students in Terms of Level of Interest

Indicators	Weighted Mean	Interpretation	Rank
1. Active participation of learners	3.41	Agree	1
2. Engagement of learners	3.37	Agree	2
3. Demonstration of understanding	3.33	Agree	3
4. Enthusiasm in learning	3.30	Agree	4
5. Motivation to learn	3.26	Agree	5
COMPOSITE MEAN	3.33	Agree	
<i>Verbal Interpretation Strongly Agree (3.50-4.49); Agree (2.50-3.49); Disagree (1.50-2.49); Strongly Disagree (1.00-1.49).</i>			

From the table above, the students concurred that game-based learning encouraged active participation by them, which had the highest weighted mean of 3.41. Learning engagement was closely ranked at 3.37, showing that students were actively engaged during the exercise. The understanding of the demonstration (3.33), enthusiasm for learning (3.30), and desire to learn (3.26) was low in rank. This indicates that although students were most amenable towards active participation, their motivation, though strong, was relatively weaker. The slight difference suggests that participation and engagement are dominant motivators that can facilitate motivation and interest throughout learning.

Recent research verified that game-based learning (GBL) enhances learner participation and engagement, and both play a crucial role as predictors of sustained motivation and higher-order understanding. According to Abdullah and Kong (2020), GBL facilitated interactive settings in which learners will be more actively engaged because games are engaging with instant feedback loops. Consistent with Table 4 findings, active participation realized the highest degree of agreement. Also, it suggests that though GBL could elicit a fair level of motivation and visible engagement, it is meaningfully integrating the content and reflective practices that are more efficient for nurturing intrinsic motivation and higher-order learning outcomes such as passion and long-term motivation. In the same light, Rahman et al. (2022) pointedly remark that novelty and form of games initially woo students, yet it is their ability to fulfill students' learning needs and affective interest that would bridge them into enduring interest.

Table 5

Influence of Game-based Learning on the Motivation and Engagement of Grade 7 Students in Terms of Giving Rewards or Other Incentives

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Classroom environment	3.78	Strongly Agree	2
2. Instructional strategies	3.74	Strongly Agree	4
3. Teacher's behavior	3.88	Strongly Agree	1
4. Assessment and feedback	3.70	Strongly Agree	5
5. Learning materials	3.76	Strongly Agree	3
COMPOSITE MEAN	3.77	Strongly Agree	
<i>Verbal Interpretation Strongly Agree (3.50-4.49); Agree (2.50-3.49); Disagree (1.50-2.49); Strongly Disagree (1.00-1.49).</i>			

According to the comments of the respondents, all the indicators had high agreement scores, and the highest weighted mean was recorded by teacher's behavior at 3.88, followed by classroom environment (3.78), learning materials (3.76), instructional strategies (3.74), and assessment and feedback (3.70). It indicates that students greatly value the good effect of the teacher and the learning-conducive classroom environment in enhancing their learning. The weighted mean of 3.77 indicates general strong agreement that these learning factors are effective. Participants would have most likely rated the highest teacher behavior as the attitude and interaction among teachers directly impact on the motivation and engagement of students, whereas grading and feedback, though significant, may have been rated lower since students tend to get stressed or less supportive in examinations. The lower score on instructional strategies could suggest that more varied or creative methods need to be used to cultivate still more learning. Recent research has confirmed that indeed various factors in the classroom such as teacher behavior and the environment they establish influences student motivation and engagement in game-based learning situations.

All the positive behaviors of the teacher, such as enthusiasm, responsiveness, and encouragement, greatly affect the learners' willingness to get emotionally involved in the lesson (Flores, 2021). The engagement of students is impacted positively by an effective classroom atmosphere of cooperation, safety, and respect, particularly when enhanced by the presence of gamification and reward systems (Mora et al., 2020). More than that, it includes effective learning materials and techniques, prompt testing, and instant feedback to be considered some of the most important factors responsible for fostering students' interest and forward momentum. Although all the above factors play a role in motivating students, students attach more significance to treatment and support they receive from teachers because positive teacher-student relationships drive emotional engagement and academic motivation (Zainuddin et al., 2020).

Table 6

Influence of Game-based Learning on the Motivation and Engagement of Grade 7 Students in Terms of Teacher's Facilitation Style

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Clear explanation of game rules	3.48	Agree	3
2. Making learning experience enjoyable	3.48	Agree	3
3. Providing encouragement and feedback	3.38	Agree	5
4. Facilitating enjoyable learning games	3.51	Strongly Agree	1
5. Guaranteeing fair play	3.49	Strongly Agree	2
6. Adjusting difficulty to learning levels	3.30	Agree	6
7. Balancing competition and collaboration	3.43	Agree	4
COMPOSITE MEAN	3.44	Agree	
<i>Verbal Interpretation Strongly Agree (3.50-4.49); Agree (2.50-3.49); Disagree (1.50-2.49); Strongly Disagree (1.00-1.49).</i>			

From Table 6, it is evident from the response of the respondents, all the indicators were given a verbal rating of "Agree" except one, with "Facilitating enjoyable learning games" having the highest weighted mean of 3.51, followed very closely by "Guaranteeing fair play" (3.49), and "Clear explanation of game rules" and "Making learning experience enjoyable" (3.48). This indicates that students put great emphasis on such characteristics of the games as making learning fun and convenient, particularly fairness and interactive gameplay. The least weighted mean was on "Adjusting difficulty to learning levels" at 3.30, that there are situations when the level of difficulty of the game does not precisely equate to students' ability. Generally, the weighted mean at 3.44 is a sign that there was an agreement that game-based learning works in enhancing their learning process.

Recent research supported that teachers' facilitation style plays a key role in the effectiveness of game-based learning, particularly in increasing students' motivation and engagement. Specifically, good facilitation, such as communicating effective game rules, ensuring fairness, and enhancing game enjoyment, has been noted to play a strong impact on students' perceptions and learning value of learning games. For example, Kebritchi, Hirumi, and Bai (2020) noted that learning environment in games work best when teachers take on a facilitative role to increase inclusivity, enjoyment, and challenge to the learner's level.

Likewise, Dichev and Dicheva (2019) research indicated that feedback, support, and the establishment of balance among competition and cooperation determines students' intrinsic motivation. Nonetheless, a challenge arises with balancing game difficulty to fit within learners' ranges, and that may impact participation if not properly managed. Generally, properly facilitated game-based learning supports active engagement and deeper commitment toward the process of learning.

Table 7
Constraints Encountered by Grade 7 Students in the Utilization of Game-based Learning on TLE

Indicators	Weighted Mean	Verbal Interpretation	Rank
Difficulty understanding rules of the game	2.46	Agree	7
Not enough time to finish tasks	2.61	Agree	3
Problems with game equipment	2.53	Agree	6
Difficulty collaborating with peers	2.31	Disagree	10
Struggle to maintain focus during the game	2.45	Disagree	8
Unfamiliarity with the topic before learning	2.63	Agree	2
Technical issues (internet/software problems)	2.55	Agree	4
Fear of failing in front of peers, discouraging participation	2.85	Agree	1
Feeling unmotivated to participate	2.35	Disagree	9
Uncomfortable feeling with game format or structure	2.54	Agree	5
COMPOSITE MEAN	2.53	Agree	
<i>Verbal Interpretation Strongly Agree (3.50-4.49); Agree (2.50-3.49); Disagree (1.50-2.49); Strongly Disagree (1.00-1.49).</i>			

According to the results, participants agreed that "fear of failing in front of peers" (WM=2.85) mostly prevailed as a problem encountered through game-based learning, while they disagreed with the statement "difficulty collaborating with peers" (WM=2.31). This means that emotional shame in doing something is in themselves a bigger issue compared to working collaboratively with their peers. The researcher assumed that the highest mean score could simply be due to students being afraid not to be embarrassed or be looked at through a negative lens once they make any mistakes, especially in situations that involve competition or public attention. The lowest score indicates that cooperation might not have been perceived as a hindrance since students are accustomed to working together and social learning skills have previously been acquired.

The conferring of emotional security to kids and acceptance from peers significantly influences learners' confidence and class participation in learning games, Huang and Hew (2018) point out. The composite mean of 2.53 classified as "Agree" corroborates Pellas, Mystakidis, and Kazanidis (2020) findings that engagement is induced through game-based learning; however, emotional impediments and technical problems can act as detractors from the learner's learning experience.

Discussion

GBL excels in retention and critical thinking (cognitive), tool confidence (manipulative), and motivation/enjoyment (affective), outperforming traditional methods per studies like Lee et al. (2020) on problem-solving and Alsubaie et al. (2021) on psychomotor skills. Teacher behavior and fairness boosted engagement, aligning with Kebritchi et al. (2020); emotional barriers like failure fear match Huang & Hew (2018).

Enhancements proposed: cognitive (Budget Blitz), manipulative (Fix-It Frenzy), affective (3-2-1 Reflection), plus BINGO for interest, badges for rewards, and Coach Mode training. Limitations include single-school scope and resource dependency; future research should expand to diverse settings

Conclusions

GBL features strongly support cognitive (e.g., concept recall WM 3.61), manipulative (e.g., tool handling WM 3.51), and affective domains (e.g., motivation WM 3.60), outperforming traditional methods.

It boosts student motivation/engagement via high interest in participation (WM 3.41), effective rewards/teacher behavior (WM 3.77-3.88), and facilitation like fair play/enjoyable games (WM 3.44-3.51).

Primary constraints include fear of peer failure (WM 2.85), unfamiliarity with topics (WM 2.63), and time/resource limits (WM 2.53-2.61), though collaboration is not a major issue (WM 2.31).

Recommendations

School heads: Provide GBL training, digital infrastructure, and celebrate innovative practices.

Teachers: Enhance problem-solving with real-life scenarios, reinforce procedures via guided feedback, and adopt supportive facilitation.

Parents: Foster home accountability with praise and manageable tasks.

Students: Actively engage, communicate, and seek feedback in games.

Future researchers: Explore peer collaboration dynamics in GBL

REFERENCES

BOOKS

- Allen, R. (2019). *Differentiated learning in the modern classroom*. New York: Harper Educational Press.
- Brooks, S. (2021). *Collaborative learning through game-based education*. London: Academic Solutions.
- Brown, P., & Wilson, K. (2020). *Interactive teaching strategies for skill-based education*. Boston: Educators' Resource Publications.
- Dela Cruz, J. (2023). *Integrasyon ng Teknolohiya sa TLE*. Quezon City: Pinoy Educational Press.
- Garcia, M. (2022). *TLE sa Makabagong Panahon*. Manila: Bagong Lipunan Publications.
- Reyes, A., & Cruz, R. (2021). *Bagong Estratehiya sa TLE*. Makati: Edukasyon Para Sa Lahat Publishing.
- Thompson, J. (2022). *Challenges and innovations in integrating technology in education*. Chicago: Modern Learning Press.

UNPUBLISHED MATERIALS

- Bautista, E. (2022). *Enhancing sewing and fashion design skills through game-based learning in TLE education*. Unpublished master's thesis, University of Batangas.
- De Guzman, R. (2024). *Game-based learning in hospitality and tourism management education: Impact on Grade 7 learners*. Unpublished doctoral dissertation, University of Santo Tomas.
- Reyes, M. (2019). *Game-based learning for technical skills development in TLE: A study of carpentry and electronics education for Grade 7 students*. Unpublished master's thesis, University of the Philippines Diliman.

JOURNALS, MAGAZINES AND PERIODICALS

- Abdullah, M. Y., & Kong, C. W. (2020). Game-based learning and student engagement: A study among secondary school learners. *International Journal of Emerging Technologies in Learning*, 15(14), 4–15.

Agarwal, A., & Gupta, R. (2021). Game-based learning in education: Enhancing students' engagement and retention. *Journal of Educational Technology & Society*, 24(3), 37-49.

Almonte, R. (2021). Game-based learning as a transformative tool for student engagement in technical education. *Journal of Educational Technology and Innovation*, 15(2), 45-59.

Alsubaie, M. A., Aldossary, D. A., & Alzahrani, A. H. (2021). The effect of game-based learning on the development of students' practical skills in vocational education. *Journal of Technical Education and Training*, 13(1), 41–50. <https://doi.org/10.30880/jtet.2021.13.01.005>

Al-Azawi, R., Al-Faliti, F., & Al-Blushi, M. (2024). Game-based learning and its impact on students' motivation and academic performance. *International Journal of Educational Technology*, 15(2), 45-60.

Cruz, J., & Martinez, L. (2023). Challenges and benefits of game-based learning in TLE classrooms: A case study in Quezon City. *Philippine Journal of Education Technology*, 38(2), 45-60.

Cruz, E. (2021). Developing emotional intelligence through game-based learning in the Philippine context. *International Journal of Educational Research*, 39(3), 89-101.

Dichev, C., & Dicheva, D. (2019). Gamifying education: what is known, what is believed and what remains uncertain: A critical review.

International Journal of Educational Technology in Higher Education, 16(1), 1–36.
<https://doi.org/10.1186/s41239-019-0177-9>

Dizon, P. (2021). Enhancing manipulative skills through digital games in TLE. *Journal of Technical and Vocational Education*, 28(2), 56-69.

Flores, M. A. (2021). Feeling valued and motivated: A study of teacher–student relationships and student engagement. *Teachers and Teaching*, 27(1–4), 66–82.
<https://doi.org/10.1080/13540602.2021.1900811>

Foster, A., & Shah, M. (2025). Teachers' experiences of using game-based learning methods in classrooms. *Teaching and Teacher Education*, 98, 103-115.

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2019). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, 111(23), 8410–8415.
<https://doi.org/10.1073/pnas.1319030111>

Garcia, J. (2019). Practical skill acquisition in TLE through gamification. *Journal of Technical Education*, 18(4), 67-80.

- Garcia, J. (2021). Cognitive engagement in game-based learning. *Philippine Journal of Educational Research*, 15(2), 89-102.
- Gonzales, V. (2019). Game-based learning and its impact on cognitive development. *Journal of Filipino Education*, 13(2), 51-64.
- Huang, B., & Hew, K. F. (2018). Implementing gamification in e-learning: A systematic review of empirical studies from 2013 to 2017. *Computers & Education*, 127, 1–13.
<https://doi.org/10.1016/j.compedu.2018.08.006>.
- Hung, C. M., Hwang, G. J., & Chang, Y. C. (2021). A personalized mobile gamified learning system for enhancing learning motivation and achievements. *Educational Technology & Society*, 24(3), 1–15.
- Jenkins, H., & Clinton, K. (2020). Game-based learning in the classroom: Opportunities and challenges for the future. *Journal of Digital Learning*, 35(2), 112-129.
- Kebritchi, M., Hirumi, A., & Bai, H. (2020). The effects of modern mathematics computer games on mathematics achievement and class motivation. *Computers & Education*, 145, 103729.
<https://doi.org/10.1016/j.compedu.2019.103729>.
- Khenissi, M. A., Essalmi, F., & Jemni, M. (2020). Personalized game-based learning environments: Effects on motivation and academic achievement. *Computers in Human Behavior*, 111, 106411. <https://doi.org/10.1016/j.chb.2020.106411>
- Kuo, Y. C., & Chuang, H. H. (2022). Game-based learning and student engagement: The role of enjoyment and self-regulation. *Journal of Educational Computing Research*, 60(6), 1451–1474.
<https://doi.org/10.1177/07356331211042197>
- Lee, J. J., & Hammer, J. (2021). Gamification in education: Motivating students with game elements. *Journal of Educational Technology & Society*, 24(3), 89–102.
- Lee, S., Kim, H., & Park, J. (2020). The role of game-based learning in developing problem-solving skills. *International Journal of Educational Research*, 99, 101512.
<https://doi.org/10.1016/j.ijer.2020.101512>.
- Lin, Y., Wang, W., Kuo, C., & Chen, P. (2024). The impact of digital educational games on students' motivation for learning. *Journal of Educational Psychology*, 116(3), 389-402
- López, P. (2020). Game-based learning: Motivating students and improving learning outcomes in technical education. *Philippine Journal of Educational Research*, 32(1), 21-35.

- López, R. (2020). Game-based learning: Motivating students and improving learning outcomes in technical education. *Philippine Journal of Educational Research*, 32(1), 21-35.
- Mendoza, J. (2021). Improving cooking skills in TLE through game-based learning: A study on Grade 7 learners. *Philippine Journal of Home Economics*, 30(3), 92-105.
- Mora, A., Riera, D., Gonzalez, C., & Arnedo-Moreno, J. (2020). Gamification: A systematic review of design frameworks. *Journal of Computing in Higher Education*, 32(3), 529–565. <https://doi.org/10.1007/s12528-019-09203-4>
- Navarro, J. (2022). Manipulative skills development through digital games in TLE education. *Journal of Technical and Vocational Education*, 29(2), 78-92.
- Ozdamli, F., & Ozdal, H. (2022). Gamification in education: Achievements and challenges. *Education and Information Technologies*, 27(1), 1–22. <https://doi.org/10.1007/s10639-021-10647-z>
- Pellas, N., Mystakidis, S., & Kazanidis, I. (2020). The effects of virtual reality and gamification on student engagement and learning outcomes. *Education and Information Technologies*, 25(6), 5081–5105. <https://doi.org/10.1007/s10639-020-10218-x>.
- Rahman, M. M., Singh, M. K. M., & Pandian, A. (2022). The effects of game-based learning on learners' motivation and engagement in ESL classrooms. *Computer Applications in Education Journal*, 2(1), 18–29. <https://doi.org/10.37506/caej.v2i1.17401>
- Ramos, A. (2020). The affective dimension of game-based learning in Philippine classrooms. *Educational Psychology Review*, 16(3), 44-58.
- Ramos, C. (2020). The cognitive impact of game-based learning in TLE: A focus on agricultural education for Grade 7 students. *Philippine Journal of Vocational Education*, 24(4), 33-47.
- Sanchez, D. (2021). The role of technology in enhancing student engagement in vocational subjects. *Philippine Educational Technology Journal*, 10(1), 15-27.
- Santos, J. (2019). The affective benefits of game-based learning in TLE education: A study on student engagement and self-confidence. *Philippine Educational Review*, 18(2), 58-72.
- Santos, R. (2020). Game-based learning as a bridge between theory and practice in TLE. *International Journal of Vocational Education*, 23(2), 33-46.
- Santos, R. (2021). Game-based learning as a bridge between theory and practice in TLE. *International Journal of Vocational Education*, 23(2), 33-46.
- Smith, J., Doe, A., & Johnson, L. (2024). Challenges in implementing game-based learning: A student perspective. *Educational Research Quarterly*, 47(1), 25-40.

- Su, C. H., & Cheng, C. H. (2020). A mobile gamification learning system for improving the learning motivation and achievements. *Journal of Computer Assisted Learning*, 36(3), 376–393. <https://doi.org/10.1111/jcal.12433>
- Tan, B. (2020). Retention and recall in game-based learning. *Journal of Philippine Education*, 18(1), 74-86.
- Tan, B. (2021). Engagement and emotional involvement in game-based learning. *Journal of Filipino Education*, 13(2), 51-64.
- Torres, E., & De la Cruz, M. (2021). Game-based learning and its impact on cognitive development. *Journal of Filipino Education*, 16(3), 65-78.
- Tung, H. (2019). Engaging students in technical education through gamification. *Educational Journal of Teaching Innovation*, 26(4), 57-71.
- Van Eck, R. (2019). Digital game-based learning: It's not just the digital natives who are restless. *Educause Review*, 54(1), 30-41.
- Wahab, S. N., & Mustapha, S. M. (2020). Enhancing vocational students' confidence and skills through gamified learning platforms. *International Journal of Learning, Teaching and Educational Research*, 19(10), 289–307. <https://doi.org/10.26803/ijlter.19.10.16>
- Wang, A. I., & Tahir, R. (2019). The effect of using Kahoot! for learning – A literature review. *Computers & Education*, 149, 103818. <https://doi.org/10.1016/j.compedu.2020.103818>.
- Wang, W., Lin, Y., & Chen, P. (2024). The psychology of rewards in digital game-based learning: A comprehensive review. *Educational Technology Research and Development*, 72(1), 1-20
- Zainuddin, Z., Chu, S. K. W., Shujahat, M., & Perera, C. J. (2020). The impact of gamification on learning and instruction: A systematic review of empirical evidence. *Educational Research Review*, 30, 100326. <https://doi.org/10.1016/j.edurev.2020.100326>

LEGAL DOCUMENTS

- Department of Education. (2015). *Policy guidelines on classroom assessment for the K to 12 basic education program* (DepEd Order No. 8, s. 2015). DepEd.
- Department of Education. (2019). *Innovation in education through ICT* (DepEd Memorandum No. 173, s. 2019). DepEd.
- Philippine Professional Standards for Teachers. (2017). *National competency-based teacher standards framework*. Department of Education.