



## Enhancing Students' Engagement in Technology and Livelihood Education (TLE) through Interactive Digital Play-Based Learning

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**Abstract.** *This study examined the effectiveness of integrating interactive online games into Technology and Livelihood (TLE) instruction for Grade 8 students under the MATATAG Curriculum. A practical action research design involving 30 learners was used, with data collected through pre- and post-tests, classroom observations, surveys, and interviews. Findings revealed that prior to the interention, students held a neutral stance toward online games, passive participation, limited resources, and classroom engagement, and mixed emotions toward learning. After integrating online games, students reported increased motivation, stronger positive perceptions, greater participation, and greater collaboration with peers. Quantitative findings showed a significant improvement in students' engagement between pre- and posttests, confirming that interactive online games substantially enhanced both motioation and participation. Qualitative results further supported these findings, highlighting increased interest, excitement, and a stronger desire to perform well in class. The study concludes that interactive online games are effective instructional tools for enhancing student engagement in TLE instruction. It is recommended that future research explore the long-term impacts of online games on academic performance, knowledge retention, and learners' behavior.*

**Keywords:** *interactive online games, students participation, students motivation*



## **A. Introduction**

The Department of Education's MATATAG Curriculum focuses on developing basic skills, critical thinking, and 21st-century abilities that prepare students for their future studies and careers. In this context, Technology and Livelihood Education (TLE) is essential for providing students with practical knowledge and skills they can use in everyday situations. However, traditional TLE teaching methods often rely on lectures, note-taking, and textbook-based activities. These approaches may not fully engage today's learners, who are used to technology and prefer more interactive methods. According to Duterte (2024), these interactive technologies emphasize that they transform learning by providing immediate feedback, fostering competition, and allowing personalized pacing, which better captures the interest of digital-native learners than traditional methods.

Based on the survey results on student engagement, learners recorded relatively low mean scores in two critical areas: the affective domain, particularly their liking for learning ( $M = 2.34$ ), which was rated low, and the behavioral domain, specifically effort and persistence ( $M = 3.42$ ), which was rated moderate. These findings indicate that many students struggle to maintain genuine interest and enthusiasm in classroom learning activities. As noted by Deng and Yang (2025), inadequate instructional strategies and insufficiently stimulating classroom content can contribute to declining engagement. The low affective score suggests that students are not fully motivated or emotionally invested in the learning process, which may negatively influence their willingness to participate actively in discussions or extend learning beyond classroom requirements. Similarly, the lower score in behavioral effort and persistence reflects a tendency among students to lose focus easily, give up when faced with challenges, or fail to consistently prioritize academic tasks over distractions.

As technology becomes increasingly integral to education, interactive online games have emerged as effective tools for enhancing student engagement and improving learning outcomes. These games can simulate real-life scenarios, provide immediate feedback, and encourage

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collaboration, making the learning process more dynamic and enjoyable. In subjects such as TLE, where hands-on experience is essential, game-based learning can increase motivation and help students build confidence in applying their skills to real-world situations. This study aims to evaluate the effectiveness of interactive online games as a teaching strategy for Grade 8 students under the MATATAG Curriculum, focusing on their impact on engagement, academic performance, and perceptions of learning.

## **B. Methodology**

The participants in this study were Grade 8 students enrolled in TLE under the MATATAG Curriculum at a selected public secondary school. One intact class, consisting of 30 students, was included to ensure that all learners consistently experienced the innovation. The research process involved several essential steps. For data collection, the researchers first secured a letter of permission to conduct the study, duly signed by the Division Superintendent and supported by an approved research proposal. This was followed by a formal letter addressed to the School Principal, outlining the purpose and scope of the study and requesting approval to proceed with data gathering. The questionnaires were then administered to participants to assess the pre- and post-initiative phases. After retrieving the completed questionnaires, the researchers conducted a thorough analysis of the data. Ethical considerations were carefully observed throughout the study. Prior to data collection, informed consent was obtained from the participants' parents or guardians, and the learners themselves provided assent to participate.

This study consisted of two questionnaires for the quantitative data, which were administered to another set of 30 participants for reliability testing. The results revealed that the motivation questionnaire obtained a Cronbach's alpha of 0.883, indicating a good level of internal consistency. Similarly, the participation questionnaire achieved a Cronbach's alpha of

0.864, indicating good internal consistency. These findings indicated that the instruments were highly reliable and suitable for use in this study.

For the qualitative component, the open-ended questionnaire underwent face validation by master teachers, mentors from the city college, and the school head. This process ensured that the questions were properly aligned with the study's objectives and were suitable for eliciting meaningful responses from the participants.

The data were analyzed using descriptive statistics (mean and standard deviation), the Wilcoxon signed-rank test, and thematic analysis. The descriptive analysis, using mean and standard deviation, measured the level of participation among respondents and described the results of the Likert-scale survey questionnaires. The normality test for the pre-initiative motivation phase produced a p-value of 0.5299, which is greater than the 0.05 significance level, indicating that the data were normally distributed. In contrast, the pre-initiative participation phase yielded a p-value of 0.02413, which is less than 0.05, suggesting that the data were not normally distributed. Similarly, the post-initiative motivation phase generated a p-value of 0.0002534, which is below 0.05, indicating a non-normal distribution. However, the post-initiative participation phase produced a p-value of 0.00002098, which is also less than 0.05, confirming that the data for this phase were not normally distributed. Therefore, the study used the nonparametric Wilcoxon signed-rank test to determine whether the pretest and posttest assessments differed significantly. In addition, thematic analysis was employed to examine and interpret learners' responses during the second-cycle focus group discussions (FGD).

### **C. Results and Discussion**

To strengthen students' perceptions of their engagement, interactive online games were employed, and the discussion of the findings and

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reflections on the data from that intervention are presented here. The outcome was presented following the problem's formulation.

**Table 1**

*Students' engagement in TLE class during the pre - initiative phase in terms of their motivation*

| Statements  | Mean | SD   | Interpretation |
|---|------|------|----------------|
| 1. I feel excited to attend my TLE class.                                   | 3.77 | 1.17 | High           |
| 2. I pay attention to lessons because they are interesting to me.           | 3.57 | 1.25 | High           |
| 3. I am eager to learn new concepts in TLE.                                 | 3.43 | 1.10 | High           |
| 4. I put effort into completing my TLE tasks even if they are challenging.  | 3.43 | 1.28 | High           |
| 5. I find the topics in TLE relevant to my future goals.                    | 2.80 | 1.10 | Moderate       |
| 6. I feel motivated to study TLE even outside of classroom hours.           | 2.77 | 1.14 | Moderate       |
| 7. I am willing to exert extra effort to improve my performance in TLE.     | 3.27 | 1.17 | Moderate       |
| 8. I enjoy learning activities in TLE lessons.                              | 3.57 | 1.01 | High           |
| 9. I set personal goals to do well in my TLE class.                         | 3.23 | 0.82 | Moderate       |
| 10. I look forward to applying what I learn in TLE to real-life situations. | 2.90 | 0.99 | Moderate       |
| Overall   | 3.27 | 1.10 | Moderate       |

*Note. 4.21–5.00 = Strongly Agree (Very High); 3.41–4.20 = Agree (High); 2.61–3.40 = Slightly Agree (Moderate); 1.81–2.60 = Disagree (Low); 1.00–1.80 = Strongly Disagree (Very Low).*

Table 1 presents students' motivation levels in TLE classes during the pre-initiative phase. The results reveal a mean of 3.27 and a standard deviation of 1.10, which is interpreted as "Moderate." This indicates that students' overall engagement level before the intervention was moderately engaged, suggesting that learners only slightly agreed with statements related to their motivation in TLE. This further implies that, prior to the integration of online games, students demonstrated average participation and interest, but not a consistently high level of engagement in the class.

The moderate level of engagement suggests that students were somewhat involved but not fully immersed in their learning experiences. They may have shown occasional interest and effort, yet lacked sustained motivation across different learning tasks. Li et al. (2024) observed that students often exhibit uncertainty or a neutral stance regarding factors influencing their motivation, which aligns with the moderate engagement reflected in the findings. Furthermore, the relatively high standard deviation of 1.10 indicates variability in responses, suggesting that while some students were actively engaged, others were less engaged. Jääskä et al. (2022) similarly noted that students' engagement varies depending on their learning preferences and perceived relevance of activities.

Among the indicators, Statements 1, 2, 3, 4, and 8 obtained mean scores ranging from 3.43 to 3.77, all of which were verbally interpreted as "High." This reflects that students were highly engaged in aspects related to interest and enjoyment, such as feeling excited to attend class, paying attention to lessons, and enjoying learning activities. In particular, Statement 1, "I feel excited to attend my TLE class," had the highest mean of 3.77, indicating that students generally showed high levels of enthusiasm and interest. This suggests that learners were inclined to attend TLE classes even before the intervention. Duterte (2024) supports this finding, stating that students tend to exhibit positive attitudes when learning environments are stimulating and interactive.

On the other hand, Statements 5, 6, 7, 9, and 10 obtained mean scores ranging from 2.77 to 3.27, interpreted as "Moderate." This indicates that students demonstrated only moderate engagement in areas related to deeper

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motivation, such as applying learning to real-life situations, studying beyond class hours, and setting personal academic goals. Notably, Statement 6, "I feel motivated to study TLE even outside of classroom hours," had one of the lowest mean scores (2.77), reflecting that students were less engaged in independent learning behaviors. This suggests that while students may participate in class, their engagement does not extend much beyond the classroom.

Overall, the findings imply that although students exhibited high engagement in immediate classroom experiences, their overall engagement remained moderate, particularly in terms of sustained motivation, persistence, and self-directed learning. This indicates a gap between students' interest and their deeper commitment to learning tasks. As noted by Cuizon and Feudo (2022), students often struggle to maintain effort and persistence when tasks become more demanding, especially without strong motivational support.

Hence, the moderate level of engagement observed in the pre-initiative phase highlights the need for instructional strategies that can enhance not only students' interest but also their sustained motivation and active involvement. This supports the implementation of innovative approaches, such as integrating online games, to further improve students' engagement in TLE classes.

Table 2 presents students' engagement levels in TLE classes during the pre-initiative phase, measured by participation. The results reveal a mean of 3.23 and a standard deviation of 1.02, which is interpreted as "Moderate." This indicates that students were moderately engaged in terms of participation prior to the intervention. It suggests that learners only slightly agreed with statements about their active involvement in classroom activities, indicating an average level of participation but not a consistently high degree of engagement.

**Table 2**

*Students' engagement in TLE class during the pre - initiative phase in terms of their participation*

| Statements  | Mean | SD   | Interpretation |
|---|------|------|----------------|
| 1. I actively join in classroom discussions during TLE lessons.                 | 3.67 | 0.90 | High           |
| 2. I volunteer to answer questions in TLE class.                                | 2.80 | 0.89 | Moderate       |
| 3. I cooperate with my classmates during group activities in TLE.               | 3.73 | 1.01 | High           |
| 4. I contribute ideas and suggestions when given the opportunity in TLE.        | 3.13 | 0.97 | Moderate       |
| 5. I ask questions when I do not understand TLE lessons.                        | 2.90 | 1.12 | Moderate       |
| 6. I participate in hands-on activities and demonstrations in TLE.              | 3.10 | 1.03 | Moderate       |
| 7. I consistently submit TLE requirements on time.                              | 2.79 | 1.05 | Moderate       |
| 8. I engage in peer learning by helping classmates understand TLE topics.       | 3.10 | 1.03 | Moderate       |
| 9. I actively participate in performance tasks and practical activities in TLE. | 3.60 | 1.07 | High           |
| 10. I show interest in class reflections or sharing sessions after TLE lessons. | 3.47 | 1.11 | High           |
| Overall   | 3.23 | 1.02 | Moderate       |

*Note. 4.21–5.00 = Strongly Agree (Very High); 3.41–4.20 = Agree (High); 2.61–3.40 = Slightly Agree (Moderate); 1.81–2.60 = Disagree (Low); 1.00–1.80 = Strongly Disagree (Very Low).*

The moderate level of engagement implies that while students were able to participate in certain activities, their involvement was not sustained across all aspects of classroom interaction. They may have engaged when required, but did not consistently demonstrate initiative or active contribution. Guiao et al. (2025) emphasized that a moderate level of engagement does not necessarily hinder learning, but it indicates room for improvement in fostering more active participation. Additionally, the standard deviation of 1.02 indicates variability in responses, suggesting that

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while some students were actively involved, others hesitated or participated minimally. Domingo (2025) supports this by noting that differences in teaching approaches and learner preferences can influence students' levels of engagement.

Looking at the individual indicators, Statements 1, 3, 9, and 10 obtained mean scores ranging from 3.47 to 3.73, all of which were verbally interpreted as "High." This indicates that students were highly engaged in collaborative and interactive aspects of participation, such as joining discussions, cooperating with classmates, completing performance tasks, and engaging in reflection activities. In particular, Statement 3, "I cooperate with my classmates during group activities in TLE," recorded the highest mean of 3.73, indicating a high level of engagement in teamwork and collaboration. This suggests that students were more comfortable participating in group settings where shared responsibility and peer support were present. Cagatan et al. (2024) highlighted that collaborative learning enhances student engagement and promotes better academic outcomes.

On the other hand, Statements 2, 4, 5, 6, 7, and 8 obtained mean scores ranging from 2.79 to 3.13, interpreted as "Moderate." This indicates that students demonstrated only moderate engagement in areas requiring individual initiative, such as volunteering to answer questions, asking for clarification, contributing ideas, and consistently submitting requirements on time. Notably, Statement 7, "I consistently submit TLE requirements on time," obtained the lowest mean of 2.79, suggesting that students showed less engagement in responsibility and task management. Similarly, Statement 2, "I volunteer to answer questions in TLE class," also reflected moderate engagement, suggesting that students were somewhat hesitant to actively participate in discussions.

These findings imply that, while students were actively engaged in group-based, structured activities, their individual participation remained moderate, particularly in tasks that required confidence, initiative, and

accountability. Cruz (2024) explained that students' willingness to participate is often influenced by factors such as self-confidence, fear of making mistakes, and perceived difficulty of the subject. Although collaborative activities encouraged participation, they did not fully translate into increased individual assertiveness.

Overall, the results indicate that students' participation during the pre-initiative phase was moderate, with stronger involvement in cooperative activities than in independent or self-initiated activities. This highlights the need for instructional strategies that not only promote collaboration but also enhance students' confidence, responsibility, and willingness to actively participate on an individual level. The findings support integrating more engaging and interactive approaches, such as online games, to further improve students' participation in TLE classes.

**Table 3.**

*Students' perception of their active participation during the pre - initiative*

| Sample Responses  | Code                  | Theme                   |
|---|-----------------------|-------------------------|
| - "I'm usually a quiet and introverted type of person. I don't really participate unless if my name is called."                         | Ways of Participation | Passive and Demotivated |
| - "I only participate if the teacher calls me."   |                       |                         |
| - "I participate in my TLE class by raising my hand whenever there's an oral recitation and contributing when there's a group project." |                       |                         |
| - "I participate in my T.L.E class by listening if what our teacher discusses and always doing the tasks that is given to me."          |                       |                         |

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|  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li>- "In grade 8, T.L.E is hard for me especially that I am a slow learner..."</li> <li>- "The challenge I face in our class is lack of materials..."</li> <li>- "Loss of interest in the subject."</li> </ul>                               | <p>Challenges Affecting Participation in TLE</p>   | <p>Lack of materials and loss of interest</p> |
| <ul style="list-style-type: none"> <li>- "I feel nervous when the teacher papasok sa klase dahil hindi ako maka learn."</li> <li>- "I get distracted easily because I always play on my cellphone..."</li> <li>- "I feel good about T.L.E because I learned so much."</li> </ul> | <p>Students' Feelings Toward TLE Participation</p> | <p>Mixed Emotions</p>                         |

Table 3 presents insights into students' perceptions in TLE classes, the challenges they face towards classroom engagement. Three dominant themes emerged: Passive and Demotivated Participation, Lack of Materials, and Mixed Emotions Toward Learning.

**Passive and Demotivated Participation.** Several students said they participate in class only when required, such as when the teacher calls on them or when group work demands it. Base to the S4 (Student 4) response "I'm usually a quiet and an introverted type of person. I don't really participate unless if my name is called." and S1 (Student 1) "I only participate if the teacher calls me.". This indicates that their participation is more a response to external prompts rather than self-initiated engagement. Pamor et al. (2024) observed that some students tend to be quiet and introverted, participating primarily in response to external cues rather than through self-initiated involvement.

**Lack of Materials and Loss of Interest.** Lack of resources such as instructional materials and learning tools were identified as a prime barrier. As to the response of S4 (Student 4) "The challenge I face in our class is lack of materials...". Students also said a decline in interest in the subject, which may

further discourage active participation. S1 (Student 1) *“Loss of interest in the subject.”*. These responses indicate low student engagement. Manlangit (2025) emphasized the importance of adequate resources and teacher support in addressing these challenges and enhancing student motivation in TLE.

**Mixed Emotions Towards Learning.** Students revealed varying emotional experiences in TLE classes. As the response of S5 (Student 5) *“I feel nervous when the teacher papasok sa klase dahil hindi ako maka learn.”* Some admitted to feeling nervous and distracted. Others, however, expressed positive emotions. Stating that they felt good about learning in TLE and acknowledged the value of the knowledge they gained. Base to the response of S7 (Student 7) *“I feel good about T.L.E because I learned so much.”* According to Manatad et. al (2020) that students’ emotional experiences impacted their motivation, participation, and overall engagement in TLE classes.

**Table 4**

*Students’ engagement in TLE class during the post – initiative phase in terms of their motivation*

| Statements   | Mean | SD   | Remarks   |
|--|------|------|-----------|
| 1. I feel excited to attend my TLE class.                                  | 4.13 | 0.73 | High      |
| 2. I pay attention to lessons because they are interesting to me.          | 3.97 | 0.89 | High      |
| 3. I am eager to learn new concepts in TLE.                                | 3.73 | 0.83 | High      |
| 4. I put effort into completing my TLE tasks even if they are challenging. | 4.20 | 0.71 | High      |
| 5. I find the topics in TLE relevant to my future goals.                   | 3.60 | 0.89 | High      |
| 6. I feel motivated to study TLE even outside of classroom hours.          | 3.40 | 0.77 | Moderate  |
| 7. I am willing to exert extra effort to improve my performance in TLE.    | 4.17 | 0.87 | High      |
| 8. I enjoy learning activities in TLE lessons.                             | 4.23 | 0.94 | Very High |
| 9. I set personal goals to do well in my TLE class.                        | 3.73 | 0.91 | High      |

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|   |      |      |      |
|---|------|------|------|
| 10. I look forward to applying what I learn in TLE to real-life situations. | 3.57 | 0.82 | High |
| Overall   | 3.87 | 0.84 | High |

*Note. 4.21–5.00 = Strongly Agree (Very High); 3.41–4.20 = Agree (High); 2.61–3.40 = Slightly Agree (Moderate); 1.81–2.60 = Disagree (Low); 1.00–1.80 = Strongly Disagree (Very Low).*

Table 4 presents students' engagement levels in TLE classes during the post-initiative phase, focusing on motivation. The results reveal a mean of 3.87 and a standard deviation of 0.84, which is interpreted as "High." This indicates that students were highly engaged in terms of motivation after the intervention. It suggests that learners generally agreed with the statements, reflecting a strong level of interest, enthusiasm, and active involvement in their TLE learning experiences following the integration of online games. The high level of engagement implies that the intervention was effective in enhancing students' motivation, as learners became more attentive, interested, and willing to participate in learning activities. Compared to the pre-initiative phase, the increase in engagement level demonstrates that students developed a more positive attitude toward TLE. Cosmiano et al. (2024) emphasized that gamification strategies significantly improve learners' motivation by making lessons more interactive and meaningful. Furthermore, the relatively lower standard deviation of 0.84 indicates that students' responses were more consistent, suggesting a shared positive perception of the learning experience. Pagente et al. (2024) noted that a lower variation in responses reflects alignment in students' engagement, indicating that most learners benefited from the intervention.

Examining the individual indicators, most statements (1, 2, 3, 4, 5, 7, 9, and 10) obtained mean scores ranging from 3.57 to 4.20, all verbally interpreted as "High." This reflects that students were highly engaged across various dimensions of motivation, including interest in attending class, paying attention, exerting effort, and applying learning to real-life situations. Notably, Statement 4, "I put effort into completing my TLE tasks even if they are challenging," obtained a mean of 4.20, indicating that students demonstrated a high level of persistence and commitment in accomplishing tasks. This suggests that the intervention not only increased interest but also strengthened students' willingness to overcome challenges.

Moreover, Statement 8, “I enjoy learning activities in TLE lessons,” recorded the highest mean of 4.23, interpreted as “Very High.” This indicates that students were very highly engaged in terms of enjoyment, highlighting that the integration of online games made learning more interactive, fun, and meaningful. Escueta (2024) supported this finding, emphasizing that game-based learning enhances students’ enjoyment and encourages active participation. This very high level of engagement suggests that enjoyment played a key role in sustaining students’ motivation throughout the lessons.

On the other hand, Statement 6, “I feel motivated to study TLE even outside of classroom hours,” obtained the lowest mean of 3.40, interpreted as “Moderate.” This indicates that students were only moderately engaged in terms of extending their learning beyond the classroom. Although the intervention successfully increased in-class motivation, it had a lesser impact on students’ willingness to engage in independent learning. This suggests that while students were highly motivated during structured classroom activities, additional strategies may still be needed to encourage self-directed learning outside school hours.

Overall, the findings reveal that students’ motivation during the post-initiative phase was highly engaged, with a notable improvement compared to the pre-initiative phase. Students demonstrated stronger interest, enjoyment, effort, and commitment to learning TLE. However, the moderate engagement in out-of-class learning indicates an area for further enhancement. These results highlight the effectiveness of integrating online games as an instructional strategy to improve students’ motivation, while also suggesting the need to strengthen strategies that promote continuous learning beyond the classroom.

**Table 5**

*Students’ engagement in TLE class during the post – initiative phase in terms of their participation*

| Statements  | Mean | SD   | Intepretation |
|---|------|------|---------------|
| 1. I actively join in classroom discussions during TLE lessons.   | 4.12 | 0.97 | High          |
| 2. I volunteer to answer questions in TLE class.                  | 3.55 | 0.83 | High          |
| 3. I cooperate with my classmates during group activities in TLE. | 3.93 | 0.87 | High          |

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|   |      |      |           |
|---|------|------|-----------|
| 4. I contribute ideas and suggestions when given the opportunity in TLE.        | 3.67 | 0.71 | High      |
| 5. I ask questions when I do not understand TLE lessons.                        | 3.73 | 0.98 | High      |
| 6. I participate in hands-on activities and demonstrations in TLE.              | 3.80 | 0.85 | High      |
| 7. I consistently submit TLE requirements on time.                              | 3.57 | 0.97 | High      |
| 8. I engage in peer learning by helping classmates understand TLE topics.       | 3.63 | 0.85 | High      |
| 9. I actively participate in performance tasks and practical activities in TLE. | 4.27 | 0.87 | Very High |
| 10. I show interest in class reflections or sharing sessions after TLE lessons. | 3.77 | 0.90 | High      |
| Overall   | 3.81 | 0.88 | High      |

*Note.* 4.21–5.00 = Strongly Agree (Very High); 3.41–4.20 = Agree (High); 2.61–3.40 = Slightly Agree (Moderate); 1.81–2.60 = Disagree (Low); 1.00–1.80 = Strongly Disagree (Very Low).

Table 5 presents the students' engagement level in TLE classes during the post-initiative phase in terms of participation. The results reveal a general mean of 3.81 with a standard deviation of 0.88, which is verbally interpreted as "High." This indicates that students were highly engaged in terms of participation after the intervention. It suggests that learners generally agreed with the statements, reflecting a strong level of active involvement, collaboration, and interaction in TLE classroom activities following the integration of online games.

The high level of engagement implies that the intervention effectively enhanced students' participation, as learners became more confident, responsive, and involved in various classroom tasks. Compared to the pre-initiative phase, the increase in participation demonstrates that students developed greater willingness to engage in discussions, group work, and

performance-based activities. Borbon (2023) emphasized that the use of technology-based tools promotes active participation by making learning experiences more dynamic and student-centered. Furthermore, the relatively low standard deviation of 0.88 indicates consistency in responses, suggesting that most students shared a common positive perception of their participation. Regudon et al. (2022) supported this, noting that gamification fosters a collaborative classroom environment and encourages uniform engagement among learners.

Examining the individual indicators, most statements (1, 2, 3, 4, 5, 6, 7, 8, and 10) obtained mean scores ranging from 3.55 to 4.12, all verbally interpreted as “High.” This reflects that students were highly engaged in various forms of participation, including joining discussions, contributing ideas, asking questions, participating in hands-on activities, and collaborating with peers. Statement 1, “I actively join in classroom discussions during TLE lessons,” with a mean of 4.12, indicates that students demonstrated a high level of engagement in verbal participation and interaction during class.

Remarkably, Statement 9, “I actively participate in performance tasks and practical activities in TLE,” recorded the highest mean of 4.27, interpreted as “Very High.” This indicates that students were very highly engaged in experiential and performance-based learning activities. It suggests that the integration of online games significantly enhanced students’ willingness to participate in hands-on tasks, making learning more interactive and meaningful. This aligns with the nature of TLE as a practical subject, where active participation in tasks is essential for skill development.

However, Statement 2, “I volunteer to answer questions in TLE class,” obtained the lowest mean of 3.55, although still interpreted as “High.” This indicates that students were highly engaged but comparatively less assertive when it comes to volunteering responses during discussions. While participation improved overall, some students may still experience hesitation due to factors such as lack of confidence or fear of making mistakes. This

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suggests that although the intervention enhanced general participation, encouraging individual assertiveness remains an area for further improvement.

Generally, the findings reveal that students' participation during the post-initiative phase was highly engaged, with strong involvement in both collaborative and individual classroom activities. The presence of a very high level of engagement in performance tasks further highlights the effectiveness of interactive and game-based strategies in promoting active learning. These results indicate that integrating online games not only increased students' participation but also fostered a more dynamic, collaborative, and engaging learning environment in TLE classes.

**Table 6**

*Significant difference in the level of students' engagement in terms of motivation during the pre and post phases of intervention*

| Motivation             | Mean | SD   | W -<br>Computed | p- value | Intepretation |
|------------------------|------|------|-----------------|----------|---------------|
| Pre -<br>Intervention  | 3.27 | 0.65 | 38              | 0.00016  | Significant   |
| Post -<br>Intervention | 3.87 | 0.53 |                 |          |               |

*Note: The critical value for W at N = 28 (p<0.05) is 116.*

Table 6 shows that the post-intervention mean of 3.87 is much higher than the pre-intervention mean of 3.27 for motivation. This indicates that the integration of interactive online games effectively enhanced students' motivation toward learning. Wang et al. (2022) found that digital game-based interventions produce moderate positive effects on student learning outcomes and are associated with improved affective motivation across various settings. These findings suggest that the use of game-based strategies not only captured learners' interest but also encouraged them to actively

engage with the lessons. Meanwhile, the standard deviation for the pre-initiative phase (0.65) is slightly higher than that of the post-initiative phase (0.53). This pattern aligns with findings from other quasi-experimental and randomized studies on gamified or game-based learning, which report higher average motivation following gamified interventions (Elzaky et al., 2022). This suggests that students' perceptions of the intervention became more consistent after its implementation, reflecting a shared positive experience and a relatively uniform agreement that interactive online games had a motivating effect on their learning.

The *p*-value of 0.00016 is less than the significance level of 0.05, indicating a significant difference in students' engagement in terms of motivation between the pre- and post-intervention phases. This suggests that the findings provide strong evidence that the implementation of interactive online games had a meaningful effect on learners' motivational levels. Casia et al. (2024) reported similar improvements in motivation following gamified interventions, demonstrating the significant impact of interactive game-based strategies on students' motivation and engagement. These results suggest that integrating such digital tools into the teaching of TLE not only captured students' interest but also fostered greater enthusiasm and willingness to participate in class activities.

**Table 7**

*Significant difference in the level of students' engagement in terms of participation during the pre and post-phases of intervention*

| Motivation             | Mean | SD   | W -<br>Computed | P -<br>Value | Description |
|------------------------|------|------|-----------------|--------------|-------------|
| Pre -<br>Intervention  | 3.23 | 0.59 | 68.5            | 0.00128      | Significant |
| Post -<br>Intervention | 3.80 | 0.62 |                 |              |             |

*Note: The critical value for W at N = 29 (p<0.05) is 126.*

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Table 7 shows a significant difference in students' engagement in terms of participation between the pre- and post-phases of the intervention. The results show that the post-intervention phase obtained the highest mean of 3.80, compared to 3.23 in the pre-intervention phase. This demonstrates that the use of interactive online games positively influenced and increased students' participation in TLE classes. The findings suggest that integrating such activities encouraged learners to be more actively involved, cooperative, and responsive during classroom discussions and tasks. Nadeem et al. (2023) highlighted that interactive online games are an effective way to promote student involvement and collaboration during TLE discussions and tasks. Meanwhile, the standard deviation in the post-intervention phase was slightly higher at 0.62 than in the pre-intervention phase at 0.59, indicating that students' perceptions of their participation remained relatively consistent. This reflects that most learners shared a common positive view of the intervention, confirming its effectiveness in enhancing classroom engagement. Kalobo (2025) emphasized that consistency in student perceptions supports the interpretation that most learners share common positive views of the intervention's impact on classroom engagement.

Furthermore, the p-value of 0.00128 is less than the significance level of 0.05, indicating a significant difference in students' engagement in terms of participation between the pre- and post-intervention phases. This result provides strong evidence that integrating interactive online games into TLE classes substantially increased student participation. It suggests that the intervention effectively encouraged learners to take a more active role in classroom activities. Barba (2021) reported that gamified learning enhances student participation and engagement, showing significant improvements in both engagement and academic performance, demonstrating that interactive online games effectively promote active learner involvement.

**Table 8**

*Interactive online games influence students' intrinsic motivation to learn TLE concepts*

| Sample Responses   | Code  | Theme                             |
|--|---|-----------------------------------|
| - "This game influence me to study because these games makes me happy and I interest to study hard."   | Effects of Interactive Online Games on TLE Learning | Boost Interest and Excitement     |
| - "Interactive Online games can significantly boost my interest and excitement in learning TLE..."   |   |                                   |
| - "I got motivate to study because we want to be the top 1 Group and it's so fun..."   | Encouragement from Online Games                     | Fun and engaging type of learning |
| - "Online games encourage me to learn TLE even outside, because online games is fun and exciting."   |   |                                   |
| - "It is like we win study hard so we can beat all the players in the game and its like the game is important to us because it is teamwork..." | Eagerness Through Online Games                      | Motivated to be on top            |
| - "I feel excited when it starts to competing on score and it encourage me more to study."   |   |                                   |

Table 8 highlights three major themes that emerged from the students' responses regarding the use of interactive online games in TLE classes: Boost Interest and Excitement, Fun and Engaging Type of Learning, and Motivated to Be on Top.

**Boost Interest and Excitement.** Students emphasized that online games made the learning process enjoyable and stimulating. As the evident

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response of S2 (Student 2) *"This game influences me to study because these games make me happy and I am interested in studying hard."* This indicates that the element of fun and entertainment inherent in games plays a vital role in sparking learners' curiosity and sustaining their interest. According to Mahmud et al. (2023), interactive digital games increase students' engagement and motivation through immersive digital environments and instant feedback. This engagement mediates the positive relationship between digital gaming and motivation to learn, aligning with the claim that enjoyment and entertainment are vital to sustaining learners' interest.

**Fun and Engaging Type of Learning.** The interactive online games made students studying more enjoyable by providing a fun and interactive platform. S5 (Student 5) response says that *"Interactive Online games can significantly boost my interest and excitement in learning TLE..."* This shows how online games can transform traditional classroom learning into a more dynamic and engaging experience. According to Sun et al. (2023), online educational games increase motivation and engagement by providing a fun, interactive way of learning tailored to different learning styles.

**Motivated to Be on Top.** Students' eagerness to compete and excel it shows that the competitive aspect of interactive online games served as a strong motivational drive. Base to the response of S8 (Student 8) *"It is like we win by studying hard so we can beat all the players in the game, and it's like the game is important to us because it is teamwork..."* This competitiveness highlights the motivational power of recognition and achievement embedded in game-based learning. According to Biona et al. (2024), competition in interactive online games promotes greater engagement and a stronger desire to be on top.

**Table 9**

*Interactive online games affect students' active participation in TLE classroom discussion and group activities.*

| Sample Responses  | Code   | Theme   |
|---|--|---|
| - "Interactive online games can boost my confidence and engagement and encourage active participation in TLE class discussions..."      | Active Participation Through Online Games                              | Boost Confidence, Motivation, and Engagement          |
| - "It's fun that's why I love TLE so much because we can play and I will study to get more higher score and be top one in TLE subject." |  |   |
| - "I'm helping my groupmates to study because I want to winners my group."  | Encouragement from Engagement in Group Tasks Through Interactive Games | Motivated to be on top and willingness to collaborate |
| - "Interactive online games makes me more engaged and willing to work with classmates in group tasks."                                  |  |   |

Table 9 highlights how interactive online games influence students' active participation in TLE classroom discussions and collaborative group tasks. Two central themes emerged: Boost Confidence, Motivation, and Engagement and Motivated to Be on Top and Willingness to Collaborate.

**Boost Confidence, Motivation, and Engagement.** Students emphasized that online games enhanced their confidence to participate in class discussions. As the response of S6 (Student 6) *"Interactive online games can boost my confidence and engagement and encourage active participation in TLE class discussions..."*. This finding suggests that the fun and competitive nature of the games encouraged them to be more engaged and motivated in TLE lessons. According to Duterte (2024) that use of badges and immediate

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feedback created a sense of accomplishment that further boosted students' motivation and confidence in learning.

**Motivated to Be on Top and Willingness to Collaborate.** Online games motivated students not only to aim for top performance but also to collaborate effectively with their groupmates. Base to the response of S1 (Student 1) *"I'm helping my groupmates to study because I want to winners my group."* Students highlighted the importance of teamwork, noting that helping their groupmates contributed to shared success. According to Li et al. (2024) that students become more willing to collaborate and compete positively simultaneously, which enhances their overall learning experience and motivation.

#### **D. Conclusion**

The study's findings suggest that students' initial uncertainty and low engagement in TLE classes were largely influenced by traditional instructional approaches that failed to fully capture their interest and motivation. The presence of passive participation, limited resources, and mixed emotional responses toward learning indicates that learners were not sufficiently stimulated to engage actively in classroom activities. However, the significant improvements observed after the implementation of interactive online games imply that game-based learning addresses these gaps by creating a more stimulating and participatory learning environment. The increase in both motivation and participation, supported by statistically significant differences between pre- and post-intervention phases, indicates that learners respond positively to interactive, technology-enhanced strategies. Moreover, the emergence of themes such as heightened interest, enjoyment, and a desire to excel reflects the development of intrinsic motivation, suggesting that students are not only participating more but are also becoming more invested in their learning. Overall, the findings imply that integrating interactive online games can effectively transform learners'

attitudes and behaviors, leading to improved engagement and a more meaningful learning experience in TLE.

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