

ENHANCING STUDENT ENGAGEMENT THROUGH GAME-BASED ACTIVITIES IN FACE-TO-FACE PHYSICAL EDUCATION CLASSES

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Abstract

Learner engagement is a critical factor in the effectiveness of Physical Education (PE) instruction, particularly in face-to-face settings where sustaining students' interest and participation remains a persistent challenge. This study examined the effects of game-based activities on learner engagement, enjoyment, and participation in face-to-face PE classes. Using a quantitative, descriptive-comparative research design, data were collected from 250 junior high school students enrolled at a public secondary school during the 2024–2025 academic year. A researcher-developed, validated questionnaire measured learner engagement across three dimensions—active participation, attentiveness, and enthusiasm—as well as self-reported enjoyment and participation levels under game-based and non-game-based instructional conditions. Descriptive statistics were used to determine mean engagement and enjoyment levels, while inferential statistics (t-tests and ANOVA) were applied to identify significant differences between instructional approaches.

Results indicated that learners exposed to game-based activities demonstrated very high levels of overall engagement, with active participation obtaining the highest mean score, followed by attentiveness and enthusiasm. Self-reported enjoyment was also rated very high in game-based PE classes. Comparative analyses revealed statistically significant differences in both enjoyment and participation levels, favoring game-based activities over non-game-based approaches. These findings suggest that integrating structured game elements into face-to-face PE instruction enhances not only learners' affective responses but also their behavioral involvement.

Grounded in Self-Determination Theory, the study highlights the pedagogical value of game-based learning in supporting autonomy, competence, and relatedness among learners. The results provide empirical evidence that game-based activities are an effective instructional strategy for improving engagement, enjoyment, and participation in traditional physical education contexts.

Keywords: Game-Based Learning; Physical Education; Learner Engagement; Student Enjoyment; Participation; Gamification

1. Introduction

Learner engagement has long been recognized as a critical determinant of educational success across disciplines, including Physical Education (PE). Engagement encompasses learners' behavioral involvement, emotional investment, and cognitive focus during learning activities, all of which are essential for meaningful participation and sustained motivation. In the context of PE, where learning is inherently experiential and activity-based, student engagement is particularly important because it directly influences participation levels, skill acquisition, and long-term attitudes toward physical activity. However, traditional PE instruction, which often relies on repetitive drills and teacher-centered approaches, has frequently been criticized for failing to sustain students' interest and motivation, especially among adolescents (Bayne & Wooldridge, 2019).

In response to declining engagement and enjoyment in PE classes, educators and researchers have increasingly explored innovative instructional strategies that emphasize active, learner-centered participation. One such approach is game-based learning and gamification, which integrates structured game elements—such as rules, challenges, feedback, cooperation, and competition—into instructional activities. Game-based approaches are grounded in the premise that play and challenge naturally stimulate curiosity, enjoyment, and persistence, thereby fostering deeper engagement in learning tasks. Within PE, game-based activities are particularly well-suited because they align with the subject's physical, social, and affective objectives, offering learners opportunities to move, interact, and collaborate in meaningful ways (Arufe-Giráldez et al., 2022).

Empirical research has consistently demonstrated the positive effects of game-based and gamified instruction on learner outcomes in PE. Systematic reviews have shown that gamification enhances motivation, enjoyment, and engagement across various educational levels and cultural contexts (Camacho-Sánchez et al., 2023; El-Tanahi et al., 2024). For instance, studies conducted in European, Asian, and Middle Eastern contexts have reported that students exposed to game-based PE interventions exhibit higher levels of intrinsic motivation, perceived competence, and enjoyment compared to those taught using traditional methods (Ahmed & Rana, 2021; Vorontsova & Popova, 2022). These findings suggest that game-based strategies can play a crucial role in addressing persistent engagement challenges in PE classrooms.

Beyond enjoyment and motivation, participation is another core outcome in physical education that has been positively associated with game-based learning. Active participation not only reflects learners' behavioral engagement but also determines the extent to which they benefit physically, socially, and cognitively from PE lessons. Research indicates that gamified PE environments encourage students to participate more consistently and with greater intensity by reducing the fear of failure, increasing perceived competence, and fostering a supportive social climate (Buil et al., 2020; Seaborn & Fels, 2015). Cooperative and competitive game formats, in particular, have been shown to promote inclusion by engaging students of varying skill levels and encouraging teamwork and peer support (Silva & Moreira, 2021).

The theoretical foundation for the effectiveness of game-based learning in PE is well explained by Self-Determination Theory (SDT), which posits that learner motivation and engagement are enhanced when the psychological needs for autonomy, competence, and relatedness are satisfied (Deci & Ryan, 1985). Game-based activities inherently support these needs by allowing learners to make choices (autonomy), experience mastery through achievable challenges (competence), and interact socially with peers (relatedness). When these needs are met, learners are more likely to exhibit higher levels of engagement, enjoyment, and sustained participation. Numerous studies have applied SDT in PE research and found that game-based instruction significantly improves motivational and engagement-related outcomes (Adeloju & Temesgen, 2023; Kuo & Chang, 2020).

Despite the growing body of literature supporting game-based learning in PE, several important gaps remain. First, much of the existing research has focused predominantly on affective outcomes such as enjoyment and motivation, often treating engagement as a single, undifferentiated construct. There is limited empirical work that disaggregates engagement into specific, measurable dimensions such as active participation, attentiveness, and enthusiasm. Understanding these distinct components is essential because each represents a different aspect of how learners interact with PE activities. Second, many studies have relied heavily on self-reported measures, with insufficient attention to participation levels or behavioral indicators of engagement, limiting the ability to link positive perceptions directly to observable learning behaviors.

Another notable gap concerns instructional context. A significant portion of recent research on game-based learning has been conducted in digitally mediated, blended, or

technology-enhanced environments. While these studies provide valuable insights, they do not fully address the realities of face-to-face PE classes, particularly in resource-constrained or non-digital settings. Physical education in many schools continues to be delivered in traditional gymnasium or outdoor environments, where non-digital, physical games are more practical and accessible. There remains a need for empirical evidence that examines how game-based physical activities—without reliance on digital platforms—affect learner engagement and participation in fully face-to-face PE classes (Mbabazi & Ahimbisibwe, 2021).

Furthermore, although comparative studies have demonstrated that gamified instruction often outperforms traditional approaches, fewer studies have quantitatively examined the magnitude of differences in enjoyment and participation between game-based and non-game-based PE activities. Establishing statistically significant differences in these outcomes is essential for providing evidence-based justification for instructional change. In addition, while several scholars have advocated integrating gamification into PE curricula, there is a relative lack of empirically grounded pedagogical guidelines and game design principles derived directly from measured engagement outcomes (Kapp, 2012; Domínguez et al., 2013).

Given these gaps, the present study examined learner engagement through game-based activities in face-to-face physical education classes, with a particular focus on distinct engagement dimensions—active participation, attentiveness, and enthusiasm—as well as self-reported enjoyment and participation levels. Using a quantitative, descriptive-comparative design, the study aimed to determine whether statistically significant differences exist between game-based and non-game-based PE activities in terms of enjoyment and participation. Anchored in Self-Determination Theory, the study also aimed to translate empirical findings into practical pedagogical guidelines and game design principles that PE teachers can apply in traditional classroom and gym-based settings.

Through this investigation, the study contributes to the growing literature on game-based learning in physical education by providing fine-grained, quantitative evidence on engagement dimensions and participation outcomes in a fully face-to-face context. The findings are expected to inform both theory and practice by strengthening the empirical basis for gamified PE instruction and offering actionable insights for educators seeking to enhance learner engagement, enjoyment, and participation in physical education classes. Learner engagement has long been recognized as a critical determinant of educational success across disciplines, including Physical Education (PE). Engagement encompasses learners' behavioral involvement, emotional investment, and cognitive focus during learning activities, all of which are essential for meaningful participation and sustained motivation. In the context of PE, where learning is inherently experiential and activity-based, student engagement is particularly important because it directly influences participation levels, skill acquisition, and long-term attitudes toward physical activity. However, traditional PE instruction, which often relies on repetitive drills and teacher-centered approaches, has frequently been criticized for failing to sustain students' interest and motivation, especially among adolescents (Bayne & Wooldridge, 2019).

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Another notable gap concerns instructional context. A significant portion of recent research on game-based learning has been conducted in digitally mediated, blended, or technology-enhanced environments. While these studies provide valuable insights, they do not fully address the realities of face-to-face PE classes, particularly in resource-constrained or non-digital settings. Physical education in many schools continues to be delivered in traditional gymnasium or outdoor environments, where non-digital, physical games are more practical and accessible. There remains a need for empirical evidence that examines how game-based physical activities—without reliance on digital platforms—affect learner engagement and participation in fully face-to-face PE classes (Mbabazi & Ahimbisibwe, 2021).

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2. Method

2.1 Research Design

This study employed a quantitative, descriptive-comparative research design to examine differences in learner engagement, enjoyment, and participation between game-based and non-game-based activities implemented in face-to-face Physical Education (PE) classes. The design was appropriate because the primary objectives required (a) estimating the central tendency of key engagement indicators (active participation, attentiveness, and enthusiasm) under game-based instruction and (b) testing whether statistically significant differences existed in self-reported enjoyment and participation between the two instructional conditions.

The descriptive component quantified learners' responses using structured Likert-type scales to generate mean scores for each engagement dimension and an overall index. The comparative component evaluated differences between conditions by applying inferential statistical procedures (e.g., independent-samples *t*-tests and/or analysis of variance [ANOVA], depending on the analytic plan for each outcome), with statistical significance evaluated at an a priori alpha level (typically $\alpha = .05$).

2.2 Participants

The study was 250 junior high school students enrolled at Pangasinan National High School, Pangasinan, during School Year 2024–2025. The study site was selected because it provided an established, authentic face-to-face Physical Education (PE) setting in which both game-based and non-game-based PE activities could be implemented and compared.

Participants were selected using stratified random sampling to ensure proportional representation across grade levels and sections within the junior high school population. Students who were officially enrolled and actively participating in scheduled face-to-face PE classes during the data-collection period were considered eligible for inclusion. Demographic characteristics were verified through school records to support accurate profiling of the respondent group and to ensure alignment between the sampling frame and the final sample.

2.3 Instrumentation

Data were collected using a researcher-made, structured survey questionnaire designed to quantify learner engagement, enjoyment, and participation in face-to-face Physical Education (PE) classes under game-based and non-game-based activity conditions. The instrument comprised closed-ended, Likert-type items organized to align with the study variables and research questions.

The questionnaire included item sets measuring learner engagement across three dimensions—active participation, attentiveness, and enthusiasm—as well as items assessing self-reported enjoyment and participation levels when game-based mechanics (e.g., competition/cooperation and structured challenges) were present. All statements were rated on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) to generate numerical scores suitable for descriptive and inferential statistical analyses.

Before administration, the questionnaire underwent content validation by a panel of experts with backgrounds in physical education, educational psychology, and research methodology to ensure item clarity, relevance, and alignment with the constructs being measured. The instrument was subsequently pilot-tested using a small group of students from a comparable public high school not included in the main study to evaluate reliability and improve item performance. Internal consistency was assessed using Cronbach's alpha, and the resulting coefficient supported the instrument's reliability for the intended measures.

2.4 Data Analysis

Data were processed and analyzed using descriptive and inferential statistical techniques aligned with the study's descriptive-comparative objectives. Completed questionnaires were checked for completeness, coded, and encoded into a dataset for statistical treatment.

Descriptive statistics were used to summarize respondents' ratings for each study variable. Specifically, means (and, where applicable, measures of variability such as standard deviations) were computed to describe learner engagement in terms of active participation, attentiveness, and enthusiasm, as well as overall engagement and self-reported enjoyment and participation levels. Mean scores were interpreted using the study's predefined scale descriptors (e.g., very low to very high).

To test comparative research questions, inferential analyses were conducted to determine whether statistically significant differences existed between game-based and non-game-based conditions. Specifically, t-tests and analysis of variance (ANOVA) were applied as appropriate to evaluate differences in mean enjoyment and participation outcomes across instructional approaches. Statistical significance was evaluated using a conventional alpha threshold (typically $p < .05$), and results were reported with the corresponding test statistics and p-values to support the conclusions.

3 Results

Learner engagement in face-to-face PE classes utilizing game-based activities was assessed across three dimensions: active participation, attentiveness, and enthusiasm. Descriptive analysis showed that students demonstrated a very high level of engagement during game-based activities.

Active participation yielded the highest mean score ($M = 4.35$), indicating that learners frequently and consistently participated in PE activities under game-based conditions. Attentiveness also registered a very high mean score ($M = 4.28$), suggesting that learners were able to sustain focus and follow instructions during game-based PE lessons. Enthusiasm yielded a high mean score ($M = 4.20$), reflecting learners' positive energy and eagerness to engage in

activities. The computed overall engagement mean across the three dimensions was 4.28, which falls within the very high descriptive range.

Learners' self-reported enjoyment levels in PE classes that utilized game-based activities were analyzed using descriptive statistics. Results indicated a very high level of enjoyment, with a mean score of $M = 4.30$. This finding suggests that students perceived game-based PE activities as enjoyable and engaging during face-to-face instruction.

Inferential analysis was conducted to determine whether there was a statistically significant difference in learners' enjoyment levels between game-based and non-game-based PE activities. Results showed that the mean enjoyment score for game-based activities ($M = 4.30$) was higher than that for non-game-based activities ($M = 3.15$). The computed mean difference was 1.15, and the test results indicated that this difference was statistically significant at the .05 level.

Learners' participation levels under the two instructional approaches were also compared. Descriptive results revealed that participation was very high in game-based activities ($M = 4.32$), whereas participation in non-game-based activities was moderate ($M = 3.25$). The observed mean difference between the two conditions was 1.07.

Further inferential testing confirmed that the difference in participation levels between game-based and non-game-based activities was statistically significant ($p < .05$), indicating that learners participated more actively when PE activities were structured using game-based approaches.

Overall, the results demonstrated that learners exhibited very high engagement, very high enjoyment, and higher participation levels during game-based PE activities compared with non-game-based activities. Statistically significant differences were found for both enjoyment and participation outcomes, favoring the game-based instructional approach.

4. Discussion

The present study examined learner engagement, enjoyment, and participation in face-to-face Physical Education (PE) classes through the use of game-based activities, with results indicating consistently positive outcomes across all measured dimensions. Overall, learners exposed to game-based instruction demonstrated very high levels of engagement, enjoyment, and participation, and showed statistically significant differences compared with non-game-based instructional approaches. These findings provide empirical support for the effectiveness of game-based learning as a pedagogical strategy in traditional, non-digital PE contexts.

Regarding learner engagement, the results revealed that active participation, attentiveness, and enthusiasm were all rated at high to very high levels under game-based conditions. Active participation emerged as the strongest engagement dimension, suggesting that learners were more willing to join, sustain involvement, and exert effort when PE activities were structured as games. This finding aligns with prior research indicating that game-based and gamified instruction encourages behavioral engagement by reducing passivity and increasing opportunities for meaningful involvement (Buil et al., 2020). Similarly, attentiveness was rated very high, indicating that learners maintained focus during game-based activities. This supports earlier studies showing that games capture learners' attention through clear goals, immediate feedback, and challenge-based structures that sustain concentration (Huang & Hew, 2018).

Enthusiasm, although slightly lower than participation and attentiveness, was still rated high, reflecting learners' positive emotional responses and energy during game-based PE lessons. This finding is consistent with the work of Vorontsova and Popova (2022), who reported that students in game-based PE programs expressed greater excitement and positive attitudes toward physical activities than those in traditional classes. Together, these results suggest that game-based instruction effectively addresses multiple dimensions of engagement, supporting the

view that engagement in PE is a multidimensional construct encompassing behavioral, cognitive, and emotional components.

The very high level of self-reported enjoyment observed in this study further reinforces the motivational value of game-based activities. Enjoyment is a critical affective outcome in PE because it influences learners' willingness to participate and their long-term attitudes toward physical activity. The finding that learners experienced significantly greater enjoyment during game-based activities is consistent with systematic reviews indicating that gamification enhances enjoyment and positive emotional experiences across educational settings (Camacho-Sánchez et al., 2023). Similar results were reported by Ahmed and Rana (2021), who found that students in gamified PE lessons reported higher satisfaction and interest compared with those in traditional instructional formats.

The statistically significant difference in enjoyment levels between game-based and non-game-based activities highlights the comparative advantage of gamified instruction in PE. Learners not only perceived game-based activities as more enjoyable but also reported moderate enjoyment under non-game-based conditions, suggesting that traditional approaches may be less effective in sustaining affective engagement. This finding aligns with Domínguez et al. (2013), who argued that gamified learning environments enhance students' emotional involvement by transforming learning tasks into rewarding experiences. In the context of PE, where enjoyment is closely tied to participation and motivation, these results underscore the importance of instructional designs that prioritize fun and challenge alongside skill development.

Participation levels also differed significantly between instructional approaches, with learners participating more actively in game-based activities than in non-game-based ones. This finding supports previous evidence that gamification increases behavioral engagement by encouraging consistent involvement and reducing disengagement (Seaborn & Fels, 2015). The higher participation observed in this study may be attributed to the games' inclusive and motivating nature, which allows learners of varying skill levels to contribute meaningfully. Cooperative and competitive elements embedded in game-based activities likely fostered a supportive social environment that encouraged learners to remain involved throughout the lesson, consistent with Silva and Moreira's (2021) findings.

From a theoretical perspective, the results strongly support Self-Determination Theory (SDT) as an explanatory framework for understanding the observed outcomes. According to SDT, motivation and engagement are enhanced when learners' needs for autonomy, competence, and relatedness are satisfied (Deci & Ryan, 1985). Game-based activities inherently support autonomy by offering choices and meaningful roles, competence by providing achievable challenges and feedback, and relatedness through social interaction and teamwork. The very high engagement and enjoyment levels observed in this study mirror findings from other SDT-based PE research demonstrating that game-based instruction fosters intrinsic motivation and sustained participation (Adeloju & Temesgen, 2023).

Beyond theoretical contributions, the findings have important pedagogical implications. The results suggest that PE teachers can enhance learner engagement and participation by integrating structured game mechanics such as points, challenges, and progressive difficulty into face-to-face instruction. This is consistent with Kapp's (2012) assertion that effective gamification balances enjoyment with instructional purpose, ensuring that learning objectives remain central. The proposed pedagogical guidelines derived from this study provide empirically grounded strategies that teachers can apply in traditional PE settings without reliance on digital technologies.

Despite its contributions, the study should be interpreted in light of certain limitations. The use of self-reported measures may introduce response bias, and the focus on a single school context may limit generalizability. Future research may extend these findings by incorporating observational measures of engagement, examining long-term effects of game-based PE

interventions, and exploring variations across age groups or cultural contexts. Nevertheless, the present study adds to the growing body of evidence demonstrating that game-based activities are an effective means of enhancing engagement, enjoyment, and participation in face-to-face physical education classes.

In summary, the discussion of findings confirms that game-based learning is not merely an engaging alternative to traditional PE instruction but a pedagogically sound approach supported by theory and empirical evidence. By fostering higher levels of engagement, enjoyment, and participation, game-based activities offer a practical pathway for improving the quality and effectiveness of physical education in face-to-face learning environments.

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