

Research Article

Cite this article: Wajabula, C. M., Degeng, I. N. S., Kuswandi, D., Praherdhiono, H., Riti, Y. U. R., Manubey, J., & Luhulima, D. A. (2026). Game On: Transforming Education with the Gamified-Flipped Classroom Strategy. *Educational Process: International Journal*, 21, e2026030. <https://doi.org/10.22521/edupij.2026.21.30>

Received September 15, 2025

Accepted March 3, 2026

Keywords: Flipped-classroom, gamification, gamified-flipped classroom, higher education, quantitative.

Author for correspondence:

Christina Martha Wajabula

✉ christina.martha.2201219@students.um.ac.id

✉ Universitas Negeri Malang & Institut Agama Kristen Negeri Ambon

**OPEN ACCESS**

© The Author(s), 2025. This is an Open Access article, distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted re-use, distribution, and reproduction, provided the original article is properly cited.

Game On: Transforming Education with the Gamified-Flipped Classroom Strategy

Christina Martha Wajabula^{ID}, I Nyoman Sudana Degeng^{ID}, Dedi Kuswandi^{ID}, Henry Praherdhiono^{ID}, Yoel Umbu Runga Riti^{ID}, Johana Manubey^{ID}, Denissa Alfiany Luhulima^{ID}

Abstract

Background/purpose. In the era of globalization, education is challenged to equip students with 21st-century skills. Although the Flipped Classroom (FC) strategy is innovative, student motivation in self-directed learning remains a challenge. This study addresses this challenge by integrating gamification into the FC model. The purpose is to design a Gamified-Flipped Classroom (GFC) framework and evaluate its impact on student engagement.

Materials/methods. This study designed and implemented a GFC framework incorporating game elements such as points, levels, leaderboards, feedback, and rewards. The impact of this strategy was then assessed by comparing student engagement levels in the GFC environment with those in a traditional FC setting.

Results. The findings reveal that implementing the GFC strategy significantly enhances student engagement compared to the conventional FC model. Gamification elements proved effective in fostering a more interactive, enjoyable, and collaborative learning environment.

Conclusion. The GFC model is an effective strategy for increasing student engagement. This research provides practical guidance for educators wishing to adopt the GFC approach and lays the groundwork for further studies on its effects on learning outcomes and student motivation.

1. Introduction

In the current era of globalization, the rapid development of knowledge and technology is influencing various aspects of life, including education. Higher education institutions are now required to equip students with 21st-century skills, which encompass creative thinking, critical thinking, communication, and collaboration. These skills are crucial for addressing challenges in an increasingly complex and technology-driven world (Celik et al., 2024). In response, pedagogical approaches like Education 4.0 have emerged, emphasizing the integration of technology to create flexible, student-centered learning environments.

One of the most prominent strategies aligned with this vision is the Flipped Classroom (FC). The FC model inverts the traditional teaching structure by moving direct instruction outside the classroom—typically through pre-recorded videos and materials—thereby freeing up valuable class time for deeper, interactive activities like problem-solving and collaborative discussions (Bergmann & Sams, 2012; Murillo-Zamorano et al., 2019). While the benefits of FC in promoting active learning are well-documented (Cheng et al., 2019), its success hinges on students' ability to self-regulate and their motivation to complete the essential pre-class activities.

However, a significant and persistent challenge identified in the literature is that not all students adapt well to the demand for independent learning. Many students lack the intrinsic motivation to engage with pre-class materials, which can undermine the model's effectiveness and lead to disengagement (Lo & Hew, 2017; Yoon et al., 2021). This motivational gap presents a critical problem for educators. To address this, gamification—the application of game design elements in non-game contexts—has emerged as a promising solution to enhance student motivation and engagement in the FC model (Zou, 2020). The combination of these two approaches has led to the development of the Gamified-Flipped Classroom (GFC).

Recent meta-analyses and studies confirm that GFC strategies generally have a positive effect on student learning and engagement (Durrani et al., 2022; Yu & Yu, 2024). However, a distinct research gap remains. While the *what* (the positive impact) is becoming clearer, the *how* is less defined. There is a need for more practical, theory-grounded frameworks that guide educators in systematically designing and implementing GFC, particularly in specific cultural and educational settings. Many existing studies focus on the outcomes without detailing the underlying design framework, making replication and adaptation difficult for other instructors.

To address this gap, this study goes beyond testing GFC by designing, implementing, and evaluating a novel, structured GFC framework. This research was conducted in an Indonesian higher education context to assess the framework's real-world impact on student engagement. Therefore, this study aims to answer the following research questions:

1. RQ1: How can a gamified-flipped classroom strategy be developed and implemented in the classroom?
2. RQ2: What is the impact of the gamified-flipped classroom strategy on student engagement?

2. Literature Review

2.1. Gamification

The term “gamification” was introduced by Nick Pelling in 2002. Gamification refers to the application of game elements in non-game contexts (Deterding et al., 2011, as cited in Sailer & Sailer, 2021). To clarify its scope, it is crucial to distinguish this concept from Game-Based Learning (GBL), which involves using entire, self-contained games to achieve specific learning objectives (Plass et al., 2015). In contrast, the focus of this study is strictly on gamification, where game elements are

strategically layered onto an existing instructional framework—in this case, the flipped classroom—to enhance motivation and engagement, rather than using a standalone game as the primary teaching tool. When applied to the learning process, gamification creates a learning environment that resembles a game. Learning activities become more interactive, fostering engagement between students and teachers. This concept emphasizes the use of game-like characteristics to enhance the learning experience (Kim et al., 2018). By incorporating elements such as points, levels, and badges, gamification can boost student motivation and engagement in learning activities. It also helps students concentrate better and grasp the material being taught.

However, the assumption that gamification consistently increases motivation is a controversial generalization widely debated in the literature. The effectiveness of gamification is not universal; its results can be varied and often depend on the design and context of its implementation (Hung, 2017). Empirical studies show mixed to positive outcomes, making it difficult to draw a single conclusion about its impact (Dichev et al., 2020; Hung, 2017). A primary criticism is that many gamification implementations focus too heavily on extrinsic rewards. According to Self-Determination Theory (SDT), such rewards risk undermining intrinsic motivation if students feel controlled by the system (Dahlstrøm, 2012; Ryan & Deci, 2000). If game elements are not deeply integrated with pedagogical goals, gamification can become superficial and fail to produce meaningful learning outcomes (Fuchs, 2023).

Furthermore, gamification is not equally effective for all students. Research identifies different student archetypes who respond differently to gamification, including "achievers" who are highly engaged, "disheartened" students who lose interest, and "underachievers" with low participation (Barata, Gama, Jorge, & Gonçalves, 2014, as cited in Hung, 2017). Students with particular learning styles or those who are not comfortable with competition may not respond positively to a gamified environment (Fuchs, 2023). Conditions under which gamification models often fail include poor design, excessive complexity, or an overly competitive atmosphere that hinders collaboration instead of fostering it (Hung, 2017).

According to Ulmer (2020) gamification is grounded in several motivational theories, including: (1) Motivation theory: Examining how intrinsic and extrinsic motivation influence learner engagement, (2) Self-determination theory: Highlighting the role of autonomy, competence, and relatedness in enhancing learner motivation, (3) Goal achievement theory: Exploring how goal-setting impacts motivation and learning outcomes, (4) Flow model: Describing the optimal experience learners achieve when engaging in challenging yet attainable activities, and (5) Feedback theory: Stressing the importance of feedback in fostering engagement and motivation during the learning process.

Some well-known and frequently used gamification frameworks are: (1) The MDA framework: focuses on mechanics, dynamics, and aesthetics in game design, (2) Werbach and Hunter's gamification framework: classifies gamification elements into dynamics, mechanics, and components, (3) The Bunchball framework: simplifies gamification elements into dynamics and mechanics, (4) Schell's gamification framework: describes four game elements, namely story, mechanism, technology, and aesthetics, (5) The integrative gamification framework: combines elements of story, dynamics, mechanics, and technology to create a comprehensive learning experience.

2.2. Flipped-Classroom

The Flipped Classroom (FC) model is a specific implementation of the Blended Learning approach. While Blended Learning broadly refers to any combination of traditional face-to-face teaching methods with online learning materials, the Flipped Classroom has a unique pedagogical distinction: the reversal of traditional learning activities (Bergmann & Sams, 2012). FC was first

introduced by Lage et al. around 2000 and later popularized as an active teaching strategy by Bergmann and Sams in 2012 (Murillo-Zamorano et al., 2019). In this model, the delivery of instructional content (e.g., through lecture videos) is moved from the classroom to the individual learning space. Class time is then used for more active learning activities, such as discussions, case studies, or project work, in which the instructor serves as a facilitator. Thus, while not all blended learning models are flipped classrooms, the flipped classroom is fundamentally a structured form of blended learning.

As a practical illustration, a common syntax, adapted from Bergmann and Sams (as cited in Ristanto et al., 2022), outlines the process in three main phases: Introduction, Home, and School. The activities within each phase are detailed in Table 1.

Table 1. Syntax Flipped-Classroom (Bergmann dan Sams)

Syntax	Activities
Introduction	• Formation of group discussion
	• Distribution of topic
	• Distribution of learning video and worksheet
Home	• Studying the video
	• Completing the worksheet and collecting the questions
School	• Discussion and peer teaching in small groups
	• Discussion and peer teaching in class (all students)
	• Conclusion
	• Kahoot

Source: Ristanto et al. (2022)

This syntax clearly illustrates the model's core principle: individual learning (content delivery) is moved to the 'Home' phase, which, in turn, frees up in-class 'School' time for collaborative application and teacher-facilitated activities such as discussion and Kahoot.

To provide a clear framework and distinguish it from simple "video homework," the Flipped Learning Network (2014; Yarbrow et al., 2014) established four fundamental pillars, known by the acronym F-L-I-P, that educators must incorporate into their practice. These pillars are:

1. Flexible Environment: Instructors create adaptable learning spaces and allow flexibility in timelines for learning and methods for assessment. This enables students to choose when and where they learn and to interact and reflect as needed.

2. Learning Culture: The model intentionally shifts the culture from a teacher-centered to a learner-centered approach. In-class time is dedicated to deeper exploration and rich learning opportunities, where students are actively involved in knowledge construction.

3. Intentional Content: Educators carefully determine what content needs to be delivered directly and what students can explore on their own. This content is curated and created to be accessible and relevant, maximizing the effectiveness of class time for active learning.

4. Professional Educator: The role of the instructor becomes more demanding and critical. Rather than being the "sage on the stage," the professional educator is a "guide on the side" who continually observes students, provides timely feedback, and reflects on their practice for continuous improvement.

The FC strategy offers several advantages, such as flexible learning times, a more learner-centered process, and encouraging students to be more active and independent (Çakir et al., 2021; Ferdiansyah et al., 2025; Wibowo et al., 2021). However, its effectiveness is not always guaranteed and faces various challenges. A significant hurdle is ensuring students prepare before class, as many often skip pre-class activities, undermining the model's core purpose (Lo & Hew, 2017). For instructors, the substantial time and effort required to create high-quality videos and redesign the curriculum pose a major barrier to adoption (Lo & Hew, 2017). From the students' side, challenges include limited or unreliable internet access, poor video quality, and difficulties with time management and self-motivation, which can lead to decreased satisfaction (Asagar, 2024; Çakir et al., 2021).

The impact of the FC on low-achieving students is particularly complex and debated. Some research suggests the model is beneficial for these students, as it offers the flexibility to learn at their own pace and revisit difficult material. Conversely, a significant experimental study found that the flipped model can widen the achievement gap. In that study, the benefits were primarily experienced by high-achieving students, while their low-achieving peers did not show similar gains and, in some cases, fell further behind (Setren et al., 2021). This suggests that without sufficient scaffolding and support structures, students who struggle with self-regulated learning may be at a disadvantage (Yoon et al., 2021). Therefore, the conditions under which the FC model may fail often include a lack of student engagement with pre-class work, insufficient support for students who need more guidance, and technological disparities (Lo & Hew, 2017).

2.3. Gamified-Flipped Classroom

Gamified-Flipped Classroom (GFC) is a flipped-classroom learning strategy based on gamification. Zou (2020) explains that the advantages of GFC include increased motivation and learner involvement, the development of learning skills and self-confidence, and improved performance and learning outcomes. Zainuddin (2018, as cited in Fahandezh & Mohammadi, 2021) describes GFC as a combination of gamification and FC teaching concepts. These two approaches differ in their definitions and operations. However, combining them can yield positive results for learning outcomes and learners' educational performance. Flipping the classroom through flipped teaching and applying gamification methods in the learning process creates opportunities to engage learners, reinforce learning, and provide direct feedback on their progress (Nkhoma et al., 2018, dalam Fahandezh & Mohammadi, 2021).

3. Methodology

This study employed a quasi-experimental design, specifically a nonequivalent control group design, to investigate the effect of the GFC strategy on student engagement. The independent variable was the learning strategy, with two levels: the experimental group (using the GFC strategy) and the control group (using a non-GFC strategy). The dependent variable was the level of student engagement, measured quantitatively.

3.1. Participants

This research was conducted at a private university in Indonesia, employing a quasi-experimental design. The participants were 72 learners selected through convenience sampling, comprising all students enrolled in the 'Learning Evaluation' course during their fifth semester. The students were divided into two groups based on their existing class structure (intact groups). The first class (n=36) was assigned as the experimental group, which employed the GFC strategy, while the second class (n=36), serving as the control group, utilized the standard FC strategy. Both groups had an identical gender distribution of 28 females and 8 males, ensuring a comparable demographic baseline.

3.2. Ethical Procedures

This study was conducted in strict adherence to ethical research principles. While the research site does not have a formal institutional review board (IRB) or ethics committee, ethical clearance was secured through the appropriate institutional channels. A formal research permit was requested by the author's home institution and subsequently approved by the Institute for Research and Community Service (Lembaga Penelitian dan Pengabdian Masyarakat - LPPM) at the research site, the official body overseeing research activities. Upon the study's conclusion, the LPPM issued an official letter confirming that the research had been completed in accordance with institutional procedures.

Regarding participant consent, a two-step verbal informed consent process was followed. First, permission to conduct the study within the classroom was obtained from the course lecturer. Following this, the researcher addressed the students directly, providing a clear explanation of the study's purpose, the procedures involved in the gamified-flipped classroom, and what their participation would entail. The students were explicitly informed that their participation was entirely voluntary and that they could choose not to participate or withdraw at any time without it affecting their course standing or grades. Verbal consent was then obtained from all students who agreed to participate.

To ensure participant confidentiality and anonymity, all students were assigned unique identification codes, and all personally identifiable information was removed from the final dataset used for analysis. All research data, including quiz scores and observational notes, were stored securely on a password-protected computer accessible only to the primary researcher to prevent unauthorized access.

3.3. The Gamified-Flipped Classroom Framework

For this study, a specific GFC framework was developed to structure the learning intervention. This framework was not arbitrary; its design was intentionally grounded in established motivational and pedagogical theories to ensure it was both engaging and instructionally sound.

3.3.1. Theoretical Foundation

The core of the GFC framework is built upon Self-Determination Theory (SDT), which posits that motivation is enhanced when three basic psychological needs are met: Autonomy, Competence, and Relatedness (Ryan & Deci, 2000). The framework also aligns with the principles of the ARCS Model of Motivational Design, which focuses on capturing Attention, establishing Relevance, building Confidence, and ensuring Satisfaction (Keller, 1987, as cited in Gagne et al., 2005).

The selection of gamification components was directly mapped to these theoretical foundations to systematically address students' motivational needs:

1. **Points and Levels:** These components were chosen to directly foster the need for Competence (SDT) and build Confidence (ARCS). Points provided immediate, quantifiable feedback on task completion and performance, while levels created a structured path of increasing complexity. This allowed students to visibly track their progress and feel a sense of mastery.

2. **Leaderboard:** The leaderboard was implemented to stimulate a sense of Competence through positive competition and Relatedness (SDT) by creating a shared social context for the class's achievements. It served to capture Attention (ARCS) by making progress public and dynamic.

3. **Rewards:** Tangible or intangible rewards were planned for significant achievements to provide Satisfaction (ARCS) and validate students' effort and competence.

4. Instant Feedback: Integrated through tools like Quizizz, immediate feedback on quizzes and tasks was crucial for reinforcing Competence (SDT). It allowed students to self-correct and identify their knowledge gaps in real time, building their confidence to tackle the next challenge.

By integrating these specific, theory-backed components, the GFC framework aimed to create an ecosystem in which students felt autonomous in their learning paths, competent in their abilities, and connected to the learning community.

3.3.2. Practical Implementation and Pedagogical Goals

The theoretical framework described above was translated into a practical learning syntax. It is important to note that the process detailed below represents a single, complete learning cycle designed for one topic within one class meeting. This cycle corresponds to one 'level' in the gamification system. The following Table 2 provides a concrete example of this cycle for 'Level 1: Concept'. While this three-stage structure (Home – Class – Home) serves as a recurring template for subsequent topics and levels, the cognitive complexity of the material and the associated tasks would increase at each new level. The table explicitly maps each gamified activity to its corresponding student activity and its Targeted Learning Achievements, clarifying the pedagogical contribution of each design element.

Table 2. Implementation of the GFC Learning Syntax

Stage	Flipped Classroom	Gamification	Gamified-Flipped Classroom (Integrated Activity)	Student Activity	Targeted Learning Achievements
Home (Pre-Class)	<ol style="list-style-type: none"> Determine learning objectives. Create pre-class activities (videos, readings, quizzes). 	<p>Level: Material is divided into levels based on difficulty.</p> <p>Points: Awarded for completing each pre-class activity.</p>	<p>Level 1: Concept...</p> <ul style="list-style-type: none"> Watch concept video (+20 pts). Read concept supplement (+20 pts). Complete concept quiz (+20 pts). 	<ul style="list-style-type: none"> Receives points and advances to the next level. Watches video, reads material, takes quiz. Notes unclear concepts. 	<p>Engagement:</p> <ul style="list-style-type: none"> Cognitive: Understands material. Behavioral: Actively watches, reads, and takes quizzes. Emotional: Feels challenged and motivated by points and levels.
Class (In-Class)	<ol style="list-style-type: none"> Plan in-class activities (discussion, presentation, group quiz). Facilitate student activities. 	<p>Points: Awarded for in-class activities.</p> <p>Leaderboard: Ranks students by points.</p> <p>Feedback: Provided periodically.</p> <p>Reward: Praise for student work.</p>	<ul style="list-style-type: none"> Group Discussion: Analyze topic (+50 pts for active discussion). Group Presentation: Present findings. Leaderboard is updated. 	<ul style="list-style-type: none"> Discusses topic, presents findings. Views individual and group leaderboard. Receives feedback and rewards (praise). 	<p>Engagement:</p> <ul style="list-style-type: none"> Cognitive: Deepens understanding, analyzes. Behavioral: Actively participates in discussion, presents. Emotional: Feels competitive (leaderboard), proud (reward). Agentic: Manages group strategy.

Stage	Flipped Classroom	Gamification	Gamified-Flipped Classroom (Integrated Activity)	Student Activity	Targeted Learning Achievements
Home (Post-Class)	5. Evaluate and follow up.	Points: Awarded for completing reflection (+20 pts).	Individual Conclusion: Students draw and submit a personal conclusion.	Reflects on the learning process and submits a conclusion.	Reflection, improvement, and skill enhancement.

As detailed in the table, the GFC syntax was designed not just for engagement but to cultivate specific skills. The pre-class stage fosters self-regulation and accountability. The in-class activities are designed to enhance critical thinking, collaboration, and communication skills through gamified discussions. Finally, the post-class stage encourages metacognitive skills through structured reflection. This integrated design ensures that each gamification element serves a clear pedagogical purpose.

3.4. Data Collection and Instrument

The primary instrument used in this study was a questionnaire designed to measure the four dimensions of student engagement: emotional, behavioral, cognitive, and agentic. The questionnaire was adapted from the validated Engagement Questionnaire developed by Reeve & Tseng (2011). It comprises 24 items formatted on a 5-point Likert scale, ranging from "strongly disagree" (coded as 1) to "strongly agree" (coded as 5).

Given that the research was conducted in Indonesia, an Indonesian version of the scale was utilized. The version adopted had been previously translated and successfully implemented in a similar educational context, providing an initial basis for its linguistic validity.

To further ensure the validity and reliability of the translated instrument for the specific population of this study, a pilot test was conducted prior to the main research. The pilot test was administered to 136 undergraduate students who were comparable to the main study participants but were not part of the final sample. The data from the pilot test were analyzed for two psychometric properties:

1. **Validity:** Item validity was assessed by calculating the item-total correlation for each item using the Pearson Correlation coefficient. The analysis showed that all 24 items were significantly correlated with the total score (all p -values < .001), confirming that each item was valid for measuring the overall construct of student engagement.

2. **Reliability:** The internal consistency of the questionnaire was evaluated using Cronbach's Alpha. The analysis yielded a Cronbach's Alpha coefficient of **0.927** for the 24 items. This value is substantially higher than the standard acceptance threshold of 0.70, indicating that the instrument possessed excellent reliability and could consistently measure student engagement.

Based on these robust validity and reliability results, the questionnaire was deemed a suitable and dependable instrument for data collection in this study.

3.5. Data Analysis

The data analysis process in this study involved two main stages: design validation and statistical analysis of student data.

First, the instructional design of the GFC was validated prior to implementation. This validation was conducted by two experts with competence in instructional design to ensure the quality, clarity, and effectiveness of the proposed learning model. The feedback from the experts was analyzed using the Gregory technique to refine the design.

Second, for the quantitative data collected from the student engagement questionnaire, statistical analysis was performed using SPSS. The analysis began with calculating descriptive statistics (means and standard deviations) to summarize and compare the engagement scores for the experimental (GFC) and control (FC) groups. To test the research hypothesis, a Mann-Whitney U test was used to determine whether there was a significant difference in the engagement scores between the two independent groups. This nonparametric test was chosen because the data were collected on an ordinal Likert scale and because it does not require the assumption of normality. The significance level (alpha) was set at $p < .05$. Finally, to evaluate the magnitude of the difference, an effect size (r) was calculated from the test's Z-value.

4. Results

4.1. Development of Gamified-Flipped Classroom Strategy (RQ1)

4.1.1. Elements of Gamification Strategy for Flipped Learning

The game elements used are points, levels, leaderboards, rewards, and feedback.

(1) Points: Some games refer to them as experience points, which are rewards for good or bad actions. Points can indicate progress and may be used to unlock restricted content.

(2) Levels: A level represents a stage or degree of difficulty in a game. The higher the level, the more challenging and complex completing tasks or missions becomes. To access level 2, level 1 must be completed first.

(3) Leaderboards: A leaderboard is a real-time list displaying the names of players who rank highest based on their success in the game. Players can view their positions directly.

(4) Rewards: In gamification, rewards are incentives or prizes given to players for achieving specific goals or exhibiting desired behaviors. Rewards are a crucial component of gamification design, aimed at enhancing user motivation, engagement, and performance.

(5) Feedback: Feedback provides players with information about their performance, achievements, or desired behaviors. It is a vital element of gamification design, intended to offer guidance, motivation, and recognition to players.

4.1.2. Syntax Gamified-Flipped Classroom Strategy

The FC syntax referenced is based on the work of Bergmann and Sams (as cited in Ristanto et al., 2022). This syntax will be adapted to incorporate gamification elements, including points, levels, leaderboards, rewards, and feedback. Consequently, the syntax or stages of gamified flipped-classroom learning to be implemented in the learning process will align with the syntax outlined in Table 3.

Table 3. Syntax Flipped-Classroom

Syntax	Activities
Introduction	• Explanation of the learning process to be conducted
	• Explanation of the LMS (Google Classroom) utilized
	• Formation of discussion groups
	• Distribution of topics
Home	Level 1-6:
	• Reading teaching materials
	• Watching the video
	• Quizizz (individual)

Syntax	Activities
	<ul style="list-style-type: none"> Concluding (independently)
School	<ul style="list-style-type: none"> Discussion and peer teaching in small groups Discussion and presentation in class Quizizz (group) Conclusion

Table 3 specifies how the standard Flipped Classroom syntax was adapted into the Gamified Flipped Classroom (GFC) strategy. The key modification is the integration of gamification elements (Quizizz) at two critical stages: first, as an individual quiz in the 'Home' phase to ensure students engage with the pre-class material, and second, as a group activity in the 'School' phase to foster collaborative review and friendly competition.

4.1.3. Validation Results of the Gamified-Flipped Classroom Strategy Design

The developed GFC strategy was validated by two instructional design experts: a professor and a doctor with extensive experience in learning technology. This validation process utilized a questionnaire comprising seven questions, structured in a formal Likert scale with five response options. Each question offered five choices, ranging from "very good" (coded as 5) to "very bad" (coded as 1).

Table 4. Validation Results of the Gamified-Flipped Classroom Strategy Design

No	Items	Value	
		Validator 1	Validator 2
1	The effectiveness of the gamified-flipped classroom design is evaluated based on its ability to meet the Learning Evaluation course's learning objectives.	5 (very good)	5 (very good)
2	The appeal of the gamified-flipped classroom design compared to other instructional designs.	5 (very good)	5 (very good)
3	The speed at which objectives are achieved in the Learning Evaluation course is enabled by the gamified-flipped classroom design.	5 (very good)	5 (very good)
4	The clarity and pace of content delivery in the Learning Evaluation course using the gamified-flipped classroom design.	5 (very good)	5 (very good)
5	The ease of access and navigation in the gamified-flipped classroom design.	4 (good)	5 (very good)
6	The coherence of content and message design in the gamified-flipped classroom design.	5 (very good)	4 (good)
7	The effectiveness of the gamified-flipped classroom design as a teaching tool encompasses both theoretical and practical aspects.	4 (good)	4 (good)

Based on the data analysis presented in Table 4 and tested using the Gregory technique, the results indicate that the validation criteria for the GFC strategy design are highly valid. Therefore, it can be concluded that the GFC strategy design is highly feasible for implementation in the learning process and meets the expected criteria to enhance its effectiveness.

4.1.4. Framework Gamified-Flipped Classroom

Based on the flipped-classroom syntax reference proposed by Bergmann and Sams, and incorporating gamification elements to enhance student interactivity and motivation, a GFC framework has been developed. This framework serves as a comprehensive guideline for teachers to effectively implement GFC learning strategies both in class and at home, to create a more engaging learning experience and positively influence student learning outcomes. Through this strategy, it is anticipated that the learning process will become more dynamic and foster active student involvement at every stage of learning.

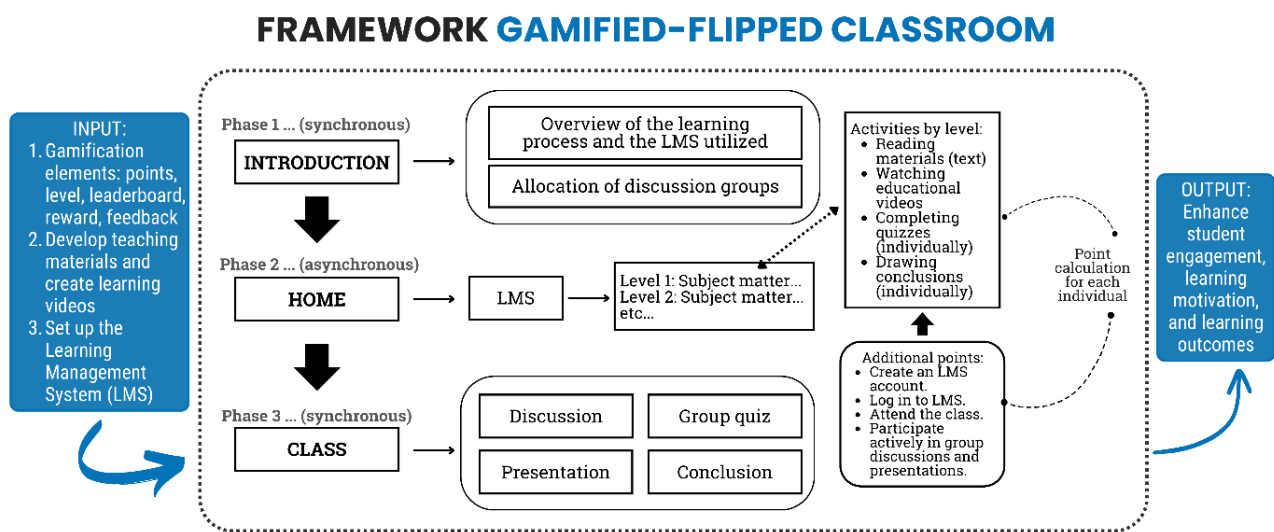


Figure 1. Framework Gamified-Flipped Classroom Strategy

As illustrated in Figure 1, the proposed framework functions as a logic model with three core components. The Input consists of the preparatory elements, including the design of gamification mechanics and learning materials. The Process outlines the three primary learning phases (Introduction, Home, Class) where the strategy is executed. Finally, the Output represents the desired pedagogical goals, such as enhanced student engagement and motivation. The following section will elaborate on each of these components in detail.

The GFC framework outlined in this study comprises three main phases: introduction, home, and class. Before delving into these core phases of the learning process, it is crucial to first identify the gamification elements to be applied in the learning context. In this study, the selected gamification elements include points, levels, leaderboards, rewards, and feedback. Once the gamification elements are determined, the next steps are to develop substantial learning materials and create engaging, informative learning videos. Additionally, preparing the Learning Management System (LMS) for use in the learning process is integral to the framework, ensuring interaction and accessibility for both students and teachers.

The point calculation process is conducted by the teacher through mutual agreement at the start of the learning process to ensure transparency and fairness in assessment. Students have the opportunity to earn additional points by completing activities at each level, creating a new account (upon initial registration), logging in to the LMS, attending class, and actively participating in group discussions.

The level elements of this strategy are reflected in the provided learning materials. The higher the level achieved, the deeper and more complex the material students will learn. This approach is expected to motivate students to complete assignments at each level, enabling them to grasp more advanced material at the next stage. The various materials taught are interconnected, fostering continuity in a more effective and comprehensive learning process.

The leaderboard, which displays the names of students with the highest rankings, is divided into two main categories: the leaderboard for individual assignment assessments and the leaderboard for group assessments with the highest quiz scores. In implementing this system, the teacher calculates the results manually, which are then displayed on the screen after the class session ends. This allows students to see their positions both as individuals and as part of a group.

Regarding the reward element, students are entitled to two types of rewards from the teacher: individual and group rewards. These rewards are distributed at the end of the semester as recognition for their achievements. Individual rewards are given to the three students with the highest scores, while group rewards are given to the three groups with the highest quiz scores.

The fifth element, which is equally important, is feedback. Feedback is delivered by the teacher at the end of each learning session. Its purpose is to provide constructive information and guidance, helping students understand the progress they have made in learning the material and identify areas that need improvement.

After all learning devices are properly prepared, the learning process begins with the introduction stage, where students are familiarized with the learning mechanism and the LMS that will be utilized. During this stage, students are also divided into discussion groups to encourage interaction and collaboration. The second stage involves independent learning at home, where students are expected to engage in activities independently using the LMS. These activities include studying the material organized by topic in the LMS, watching the provided learning videos, and completing quizzes individually through interactive applications such as Quizizz or Kahoot!. Students are expected to draw conclusions from the material they have studied. The processing time for these activities will be detailed further in Figure 2. Each activity contributes to the accumulation of individual points, which reflect the student's progress. In the third stage, activities shift to direct interaction in the classroom, where students participate in group discussions, presentations, group quizzes, and collaboratively draw conclusions with their teachers. Additional points can also be earned by registering for an LMS account, logging in to the LMS, attending class, and actively participating in discussions.

The result (output) of implementing the GFC framework is a notable increase in student engagement, learning motivation, and achievement of learning outcomes, highlighting that the primary goal of this strategy is to foster a more interactive, collaborative, and effective learning experience within the educational context. However, this study will focus on the influence of the GFC strategy on student engagement, with the analysis emphasizing aspects relevant to student interaction in a learning environment that uses the collaborative method. This approach aims to provide a deeper understanding of the GFC strategy's contribution to student engagement dynamics and to explore its practical implications in a broader educational context.

To demonstrate how this framework translates into a practical weekly schedule, Figure 2 illustrates the flow of activities within a single learning session.

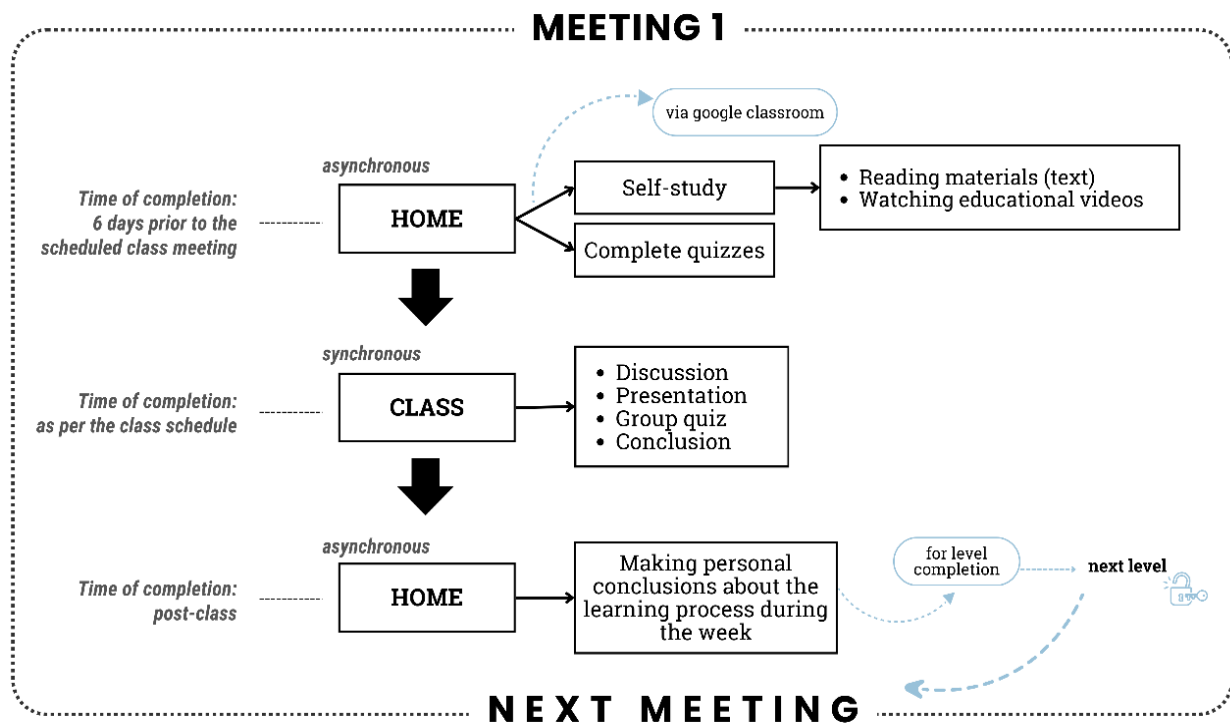


Figure 2. Explanation of the Phases of the Gamified-Flipped Classroom Strategy in A Single Session

Based on the learning activity design derived from the GFC framework (Figure 1), Figure 2 provides a detailed explanation of the stages of the GFC strategy implemented in each meeting. In this context, the learning arrangements within the GFC strategy encompass two primary approaches: asynchronous and synchronous. As is widely understood, asynchronous and synchronous learning differ in terms of time and interaction between students and teachers. In the asynchronous approach, students have the flexibility to access materials and complete assignments at their own convenience, without adhering to the same schedule as other students. Conversely, the synchronous approach involves real-time interaction between students and teachers in the classroom, fostering opportunities for more dynamic discussions and feedback.

The learning process for each meeting begins with independent activities at home, where students complete various tasks, including studying materials, watching educational videos, and taking quizzes to assess their understanding of the material. These activities are to be completed within a six-day period before the scheduled face-to-face classroom meeting.

Subsequently, during the scheduled classroom session, students participate in synchronous learning activities, including interactive discussions, group presentations, group quizzes, and collaborative conclusions drawn by students and teachers.

After the classroom session concludes, students reflect at home and formulate personal conclusions about the learning process they experienced throughout the week. All stages of this activity are designed to ensure students are prepared for the next meeting, where completing the current learning level grants access to the subsequent level.

Thus, through examples of learning stages applied in a single meeting, it demonstrates a learning structure that integrates asynchronous and synchronous methods, allowing students to study independently before and after class meetings while collaborating with group members during class sessions. This approach fosters a more comprehensive, integrated, and holistic learning experience.

4.2. The Impact of the Gamified-Flipped Classroom Strategy On Student Engagement (RQ2)

To address the second research question on the impact of the GFC strategy, a Mann-Whitney U test was conducted to determine whether a statistically significant difference existed in engagement scores between the experimental group (GFC) and the control group (FC).

The analysis was performed based on the data presented in the Test Statistics table (Table 4). The test results provided the core statistical values needed for this comparison. The test yielded a Mann-Whitney U value of 441.000, a Z-score of -2.337, and a significance value of $p = .019$.

Table 5. Test Statistics (Mann-Whitney)

	Engagement
Mann-Whitney U	441.000
Wilcoxon W	1107.000
Z	-2.337
Asymp. Sig. (2-tailed)	0.019

a. Grouping variable: strategy

According to the standard significance threshold ($\alpha = 0.05$), the obtained p-value of 0.019 is smaller, leading to rejection of the null hypothesis. This result confirms that the difference in engagement scores between the two groups is statistically significant and not due to random chance.

To quantify the magnitude of this difference, an effect size was calculated using the formula $r = Z / \sqrt{N}$, where N is the total number of participants (72). This calculation yielded an effect size of $r = .28$, indicating a small-to-medium effect and suggesting that the GFC strategy had a noticeable, practically meaningful positive impact on student engagement.

In conclusion, the statistical analysis provides clear evidence that the implementation of the Gamified-Flipped Classroom strategy led to a statistically significant and meaningful improvement in student engagement levels compared to the standard Flipped Classroom approach.

5. Discussion

In the context of increasingly deepening globalization and rapid technological advancements, the education sector faces significant challenges in adapting to the skill demands of the 21st century. Consequently, a teacher's creativity becomes a crucial factor in creating a learning experience that is not only engaging but also effective for students, enabling them to adapt well to the skills required in this era. Bell (2018) highlighted that incorporating game elements into education can help foster a more dynamic and interactive learning environment. Specifically, the use of game mechanics—such as challenges, feedback, and rewards—can enhance students' motivation to actively participate in the learning process.

To address this need, this study has developed a GFC strategy framework, which integrates game elements with a flipped-classroom approach. The GFC framework serves not only as a conceptual model but also as a practical guide for implementing an effective learning process using this strategy. Within this framework, the game elements applied include point systems, levels, leaderboards, rewards, and feedback, all designed to boost student engagement and inspire their enthusiasm to master the skills essential in this modern era.

The study on implementing the GFC strategy revealed that it significantly enhanced student engagement compared to the traditional FC strategy. These findings align with several previous

studies. Durrani et al. (2022) demonstrated that the GFC model is more effective in boosting student engagement than the traditional approach. Students participating in GFC exhibited higher engagement, resulting in a more interactive and enjoyable learning experience. According to their findings, GFC not only improved student engagement but also enhanced learning motivation and task orientation. Students reported feeling more involved in class activities, which helped them better understand the material. Additionally, GFC simplified learning techniques, enabling students to focus on comprehending the material rather than being overwhelmed by complex strategies. This contributed to a more positive learning experience.

Huang & Hew (2018) developed and tested a gamification design model called GAFCC (goal-access-feedback-challenge-collaboration) to boost learner motivation in completing out-of-class learning activities. This model was implemented in a flipped-classroom context, where learners were required to complete pre-class activities before attending face-to-face sessions. Learners in the study also reported feeling more motivated and engaged in learning when gamification elements were incorporated. They noted that gamification helped them set higher goals and fostered increased social interaction among peers.

Sailer & Sailer (2021) highlighted that one key factor supporting learner engagement is immediate feedback provided through quizzes. This type of feedback enables learners to assess their performance in real-time, fostering greater engagement and motivation in the learning process. By completing quizzes, learners identify areas requiring improvement, helping them better understand the material to be studied next.

Furthermore, research by Aşıksoy (2018) in physics classes demonstrated that implementing a gamified flipped classroom environment (GFCE) significantly enhanced students' motivation and engagement in learning. This method makes physics learning more engaging and enjoyable, as game elements like points, badges, and leaderboards boost student involvement by fostering a positive competitive atmosphere.

These findings also resonate strongly with several studies conducted within the Indonesian higher education context, underscoring the relevance of GFC for enhancing student engagement. For instance, a study by Farida, Keumala, and Zainuddin (2021) at STIA Nasional reported that combining flipped learning with Kahoot!-based gamification successfully created a more active, enjoyable, and innovative online class, which positively affected students' motivation to learn. Similarly, research by Permatasari et al. (2024) at the State University of Malang demonstrated that applying gamification to an online Visual Programming course successfully increased students' behavioral engagement, encouraging them to be more persistent and to participate actively. Further strengthening this local perspective, a qualitative study by Rabi'ah, Hadiwinarso, and Jannah (2025) at IAIN Madura investigated the use of gamification in an English-language course for non-English-major students. Their findings revealed that gamification elements like points and interactive competitions significantly boosted student motivation and participation. Importantly, the approach also reduced language anxiety and the fear of making mistakes, creating a more dynamic and supportive learning environment that led to improved language proficiency.

James Paul Gee (as cited in Bell, 2018), an expert on the intersection of games and education, contends that superior learning theories are often embedded in video games children play, compared with traditional school teaching methods. Games offer opportunities to learn in a risk-free environment, where failure is treated as part of the learning process, thereby alleviating the fear of failure and enhancing motivation.

However, to provide a balanced and critical perspective, it is essential to discuss a nuance observed during the study. While the GFC strategy successfully increased behavioral engagement, there were indications that students' focus sometimes shifted toward superficial game elements

(e.g., earning points, competing on the leaderboard) rather than toward a deep understanding of the academic content. This observation reflects a well-documented tension in the literature, where gamification can sometimes act as a distraction. As noted by Yu & Yu (2024), there is a risk that students may engage with the 'game' layer of the course rather than the 'content' layer, leading to enthusiastic participation that does not always translate into deep learning (Lieberoth, 2015, as cited in Dichev et al., 2020).

This potential for distraction also highlights the issue of cognitive load. According to Sweller's Cognitive Load Theory (Sweller, 1988; Sweller et al., 2019), poorly designed or overly complex gamification can increase extrinsic cognitive load, forcing students to divide their attention between understanding the subject matter and navigating the game's rules. This suggests that the quantity of game elements does not determine the effectiveness of GFC, but rather their careful pedagogical integration to ensure they support, rather than compete with, the primary learning objectives.

Therefore, a limitation of this study is that its quantitative engagement metric does not distinguish between deep, content-focused engagement and more superficial, game-focused activity. Future research should aim to investigate not only *if* GFC increases engagement, but also the *quality* and *nature* of that engagement. The challenge for educators, as highlighted by this study, is to design gamified experiences that synergistically enhance—rather than distract from—the core goals of learning.

Thus, this study demonstrates that both children and adults can learn more effectively through games, which not only create a more enjoyable learning environment but also significantly enhance students' skills and knowledge. The implementation of the GFC strategy has the potential to offer a more engaging and relevant learning experience in today's world, transforming learning activities from mere obligations into desired and enjoyable pursuits for individuals across age groups. This approach not only motivates students but also fosters active participation and emotional involvement, which are essential elements in a sustainable and meaningful learning process.

6. Conclusion

Playing is an enjoyable activity that transcends age and is not limited to children. The concept of learning through play is equally relevant for adults. In the realm of education, gamification has been proven to enhance student engagement at both school and higher education levels. Consequently, in this era of globalization and Education 4.0, the urgency to adopt innovative learning strategies has become increasingly apparent. The GFC strategy design emerges as a method to create a more engaging and interactive learning experience.

The GFC strategy integrates gamification elements with a flipped-classroom approach to boost student engagement and motivation. This strategy not only fosters more interactive and enjoyable learning but also encourages students to take ownership of their learning process.

By incorporating gamification elements such as points, levels, leaderboards, rewards, and feedback, GFC aims to establish a more engaging and collaborative learning environment. Previous studies indicate that GFC enhances student motivation, participation in the learning process, and overall academic outcomes. Using technology and innovative learning designs, GFC enables students to learn independently while collaborating with peers, resulting in a more holistic learning experience.

In summary, GFC provides an effective solution to the challenges of modern education and can be applied as a valuable learning strategy across various educational contexts. This study opens avenues for further research on the implementation of GFC strategies in education and their impact on learning outcomes, motivation, self-regulated learning, and related areas.

7. Limitations and Suggestions for Future Research

The findings of this study should be interpreted in light of several limitations. First and foremost, the study employed a quasi-experimental design without a pre-test to measure the initial level of student engagement. While the use of intact classes randomly assigned to the experimental and control conditions helped mitigate potential biases, it does not guarantee that the two groups were equivalent at the outset. Consequently, it is possible that pre-existing differences in engagement or other unmeasured variables between the groups could have influenced the final outcomes. To address this limitation, future research should adopt a more rigorous pre-test-post-test design to allow for a more accurate assessment of the direct impact attributable to the GFC strategy.

A second limitation pertains to the method of data collection. The assessment of student engagement in this study was based exclusively on quantitative survey data. While this approach provided valuable numerical insights, it did not capture the qualitative nuances of the learning experience, such as how students personally perceived the gamified elements. Therefore, the validity of the findings could have been further enhanced through a mixed-methods approach. Future research would be significantly strengthened by incorporating qualitative data collection tools, such as student journals or focus group interviews, to provide a richer, more holistic understanding of the student experience.

Finally, a third limitation concerns the context-specific nature of this study. The intervention was implemented within a single course, focusing on a specific academic subject and student demographic. Therefore, the generalizability of the findings to other contexts remains unconfirmed. Building on this, future studies should investigate the effectiveness of this framework in diverse academic disciplines (e.g., humanities vs. technical sciences), different educational levels (e.g., undergraduate vs. graduate), and varied course modalities (e.g., fully online vs. hybrid). Such research would be invaluable for refining the GFC framework into a more robust pedagogical model and providing guidelines for its application in a wider range of educational environments.

Declarations

Author contribution. All authors have read and approved the final version of the manuscript. Christina Martha Wajabula: Conceptualization, Data analysis, Editing, Writing- Original Draft. I Nyoman Sudana Degeng, Dedi Kuswandi, Henry Praherdhiono: Supervision, Validation, Methodology. Yoel Umbu Runga Riti, Johana Manubey, Denissa Alfiany Luhulima: Data collection and literature review.

Conflicts of Interest. The authors declare no conflict of interest in this publication.

Funding. This research was supported by the Lembaga Pengelolaan Dana Pendidikan (LPDP) from the Ministry of Finance of the Republic of Indonesia.

Ethical Approval. Prior to the commencement of the study, approval was obtained from the Rector of the Institut Agama Kristen Negeri Ambon. This was to ensure that the research complied with ethical standards and respected the privacy and confidentiality of all participants.

Data Availability Statement. Data are available upon request from the corresponding author.

Acknowledgements. The authors gratefully acknowledge the support of the promoter, co-promoter, chairman, and all staff of the Department of Instructional Technology, Faculty of Education, State University of Malang, Indonesia. The authors also thank the students who participated in this study. The author expresses gratitude to the Lembaga Pengelolaan Dana Pendidikan (LPDP) from the Ministry of Finance of the Republic of Indonesia. Lastly, during the preparation of this work, the authors used an AI tool to improve the language, grammar, and structure. The authors declare that they reviewed and edited the output as needed and take full responsibility for the content of the published article.

References

- Asagar, M. S. (2024). The Benefits and Challenges of Flipped Learning: A Study on Students' Perception. *Synergy: International Journal of Multidisciplinary Studies*, 1(3), 41–50. <https://doi.org/10.63960/synergyint.j.multidiscip.stud.v1i3.25>
- Aşıksoy, G. (2018). The effects of the gamified flipped classroom environment (GFCE) on students' motivation, learning achievements, and perception in a physics course. *Quality & Quantity*, 52(1), 129–145. <https://doi.org/10.1007/s11135-017-0597-1>
- Bell, K. (2018). *Game On!: Gamification, Gameful Design, and the Rise of the Gamer Educator*. Johns Hopkins University Press.
- Bergmann, J., & Sams, A. (2012). *Flip Your Classroom: Reach Every Student in Every Class Every Day*. International Society for Technology in Education.
- Çakir, R., Sayin, V., & Bektas, S. (2021). Bibliometric Analysis of Studies Conducted between 2015-2019 on the Flipped Classroom Model. *International Journal of Research in Education and Science*, 7(1), 163–187. <https://doi.org/10.46328/ijres.1126>
- Celik, I., Gedrimiene, E., Siklander, S., & Muukkonen, H. (2024). The affordances of artificial intelligence-based tools for supporting 21st-century skills: A systematic review of empirical research in higher education. *Australasian Journal of Educational Technology*, 40(3), Article 3. <https://doi.org/10.14742/ajet.9069>
- Cheng, L., Ritzhaupt, A. D., & Antonenko, P. (2019). Effects of the flipped classroom instructional strategy on students' learning outcomes: A meta-analysis. *Educational Technology Research and Development*, 67(4), 793–824. <https://doi.org/10.1007/s11423-018-9633-7>
- Dahlstrøm, C. (2012). Impacts of gamification on intrinsic motivation. *Education and Humanities Research*, 1. https://www.ntnu.edu/documents/139799/1279149990/04+Article+Final_camildah_fors%C3%B8k_2017-12-06-13-53-55_TPD4505.Camilla.Dahlstr%C3%B8m.pdf
- Dichev, C., Dicheva, D., & Irwin, K. (2020). Gamifying learning for learners. *International Journal of Educational Technology in Higher Education*, 17(1), 54. <https://doi.org/10.1186/s41239-020-00231-0>
- Durrani, U. K., Al Naymat, G., Ayoubi, R. M., Kamal, M. M., & Hussain, H. (2022). Gamified flipped classroom versus traditional classroom learning: Which approach is more efficient in business education? *The International Journal of Management Education*, 20(1), 100595. <https://doi.org/10.1016/j.ijme.2021.100595>
- Fahandezh, F., & Mohammadi, A. (2021). The Effect of Gamified Flipped Classroom on the Improvement of Vocabulary Learning of Iranian Pre-Intermediate EFL Learners. *Vision: Journal for Language and Foreign Language Learning*, 10(2), Article 2. <https://doi.org/10.21580/vjv10i28577>
- Farida, R., Keumala, C. M., & Zainuddin, Z. (2021). Pengembangan dan Implementasi Model Pembelajaran Daring Flipped Learning Berbasis Gamifikasi Pada Era New Normal Covid-19. *Pedagogik: Jurnal Ilmiah Pendidikan Dan Pembelajaran Fakultas Tarbiyah Universitas Muhammadiyah Aceh*, 8(2, Oktober), Article 2, Oktober. <https://doi.org/10.37598/pjpp.v8i2>
- Ferdiansyah, H., Degeng, I. N. S., Kuswandi, D., & Praherdhiono, H. (2025). Integrating The Tudang Sipulung Culture into The Flipped Classroom Strategy for Conceptual Understanding and Problem Solving in Science Subjects. *Educational Process: International Journal*. <https://doi.org/10.22521/edupij.2025.18.438>

- Flipped Learning Network (FLN). (2014, March 12). Definition of Flipped Learning. *Flipped Learning Network Hub*. <https://flippedlearning.org/definition-of-flipped-learning/>
- Fuchs, K. (2023). Challenges with Gamification in Higher Education: A Narrative Review with Implications for Educators and Policymakers. *International Journal of Changes in Education*, 1(1), 51–56. <https://doi.org/10.47852/bonviewIJCE32021604>
- Gagne, R. M., Wager, W. W., Golas, K. C., Keller, J. M., & Russell, J. D. (2005). Principles of instructional design, 5th edition. *Performance Improvement*, 44(2), 44–46. <https://doi.org/10.1002/pfi.4140440211>
- Huang, B., & Hew, K. F. (2018). Implementing a theory-driven gamification model in higher education flipped courses: Effects on out-of-class activity completion and quality of artifacts. *Computers & Education*, 125, 254–272. <https://doi.org/10.1016/j.compedu.2018.06.018>
- Hung, A. C. Y. (2017). A critique and defense of gamification. *Journal of Interactive Online Learning*, 15(1). <https://www.academia.edu/download/96158633/15.1.4.pdf>
- Kim, S., Burton, J., Lockee, B., & Song, K. (2018). *Gamification in Learning and Education: Enjoy Learning Like Gaming* (1st ed. 2018). Springer International Publishing : Imprint: Springer. <https://doi.org/10.1007/978-3-319-47283-6>
- Lo, C. K., & Hew, K. F. (2017). A critical review of flipped classroom challenges in K-12 education: Possible solutions and recommendations for future research. *Research and Practice in Technology Enhanced Learning*, 12(1), 4. <https://doi.org/10.1186/s41039-016-0044-2>
- Murillo-Zamorano, L. R., López Sánchez, J. Á., & Godoy-Caballero, A. L. (2019). How the flipped classroom affects knowledge, skills, and engagement in higher education: Effects on students' satisfaction. *Computers & Education*, 141, 103608. <https://doi.org/10.1016/j.compedu.2019.103608>
- Permatasari, A. M., Ulfa, S., Kuswandi, D., & Soepriyanto, Y. (2024). Behavioural Engagement in Visual Programming Online Course Gamification. *Journal of Educational Technology Studies and Applied Research*, 1(1), 1–5. <https://doi.org/10.70125/jetsar.v1i1y2024a2>
- Plass, J. L., Homer, B. D., & Kinzer, C. K. (2015). Foundations of Game-Based Learning. *Educational Psychologist*, 50(4), 258–283. <https://doi.org/10.1080/00461520.2015.1122533>
- Rabi'ah, Hadiwinarso, Y., & Jannah, R. (2025). Gamification and Interactive Learning: Enhancing Students' Engagement and Proficiency Outcomes. *Entita: Jurnal Pendidikan Ilmu Pengetahuan Sosial Dan Ilmu-Ilmu Sosial*, 909–920. <https://doi.org/10.19105/ejpis.v1i.19133>
- Reeve, J., & Tseng, C.-M. (2011). Agency as a fourth aspect of students' engagement during learning activities. *Contemporary Educational Psychology*, 36(4), 257–267. <https://doi.org/10.1016/j.cedpsych.2011.05.002>
- Ristante, R. H., Kristiani, E., & Lisanti, E. (2022). Flipped Classroom–Digital Game-Based Learning (FC-DGBL): Enhancing Genetics Conceptual Understanding of Students in Bilingual Programme. *Journal of Turkish Science Education*, 1. <https://doi.org/10.36681/tused.2022.124>
- Ryan, R. M., & Deci, E. L. (2000). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, 25(1), 54–67. <https://doi.org/10.1006/ceps.1999.1020>
- Sailer, M., & Sailer, M. (2021). Gamification of in-class activities in flipped classroom lectures. *British Journal of Educational Technology*, 52(1), 75–90. <https://doi.org/10.1111/bjet.12948>

- Setren, E., Greenberg, K., Moore, O., & Yankovich, M. (2021). Effects of Flipped Classroom Instruction: Evidence from a Randomized Trial. *Education Finance and Policy*, 16(3), 363–387. https://doi.org/10.1162/edfp_a_00314
- Sweller, J. (1988). Cognitive Load During Problem Solving: Effects on Learning. *Cognitive Science*, 12(2), 257–285. https://doi.org/10.1207/s15516709cog1202_4
- Sweller, J., Van Merriënboer, J. J. G., & Paas, F. (2019). Cognitive Architecture and Instructional Design: 20 Years Later. *Educational Psychology Review*, 31(2), 261–292. <https://doi.org/10.1007/s10648-019-09465-5>
- Ulmer, J., Braun, S., Cheng, C.-T., Dowey, S., & Wollert, J. (2020). Human-Centered Gamification Framework for Manufacturing Systems. *Procedia CIRP*, 93, 670–675. <https://doi.org/10.1016/j.procir.2020.04.076>
- Wibowo, D. E., Mahmudi, A., Pujiastuti, P., & Perdana, M. A. (2021). Persepsi Penggunaan Flipped Classroom di Sekolah Dasar selama Pandemi Covid 19. *Jurnal Penelitian Ilmu Pendidikan*, 14(2), Article 2. <https://doi.org/10.21831/jpipfip.v14i2.37920>
- Yarbro, J., McKnight, P., Arfstrom, K. M., & McKnight, K. (2014). *EXTENSION OF A REVIEW OF FLIPPED LEARNING*. <http://flippedlearning.org/wp-content/uploads/2016/07/Extension-of-Flipped-Learning-Lit-Review-June-2014.pdf>
- Yoon, M., Hill, J., & Kim, D. (2021). Designing supports for promoting self-regulated learning in the flipped classroom. *Journal of Computing in Higher Education*, 33(2), 398–418. <https://doi.org/10.1007/s12528-021-09269-z>
- Yu, Q., & Yu, K. (2024). The effects of gamified flipped classroom on student learning: Evidence from a meta-analysis. *Interactive Learning Environments*, 32(9), 5126–5141. <https://doi.org/10.1080/10494820.2023.2209791>
- Zou, D. (2020). Gamified flipped EFL classroom for primary education: Student and teacher perceptions. *Journal of Computers in Education*, 7(2), 213–228. <https://doi.org/10.1007/s40692-020-00153-w>

About the Contributor(s)

Christina Martha Wajabula, is a doctoral student at the Instructional Technology, Universitas Negeri Malang, Indonesia. She also earned her Master's degree in the same field. She lectures in the Department of Educational Technology, Faculty of Christian Education, at the Institut Agama Kristen Negeri Ambon, Indonesia.

Email: christina.martha.2201219@students.um.ac.id

ORCID: <https://orcid.org/0000-0001-5291-2632>

I Nyoman Sudana Degeng, is a professor of the Educational Technology Department, College of Education, Universitas Negeri Malang, Indonesia. His expertise is in Assessment Design, Monitoring, and Performance Evaluation.

Email: nyoman.sudana.d.fip@um.ac.id

ORCID: <https://orcid.org/0000-0003-4684-552X>

Dedi Kuswandi, is a professor of the Educational Technology Department, College of Education, Universitas Negeri Malang, Indonesia. He specializes in learning models and strategies.

Email: dedi.kuswandi.fip@um.ac.id

ORCID: <https://orcid.org/0000-0002-7810-6169>

Henry Praherdhiono, is an associate professor of the Educational Technology Department, College of Education, Universitas Negeri Malang, Indonesia. His expertise is in learning environments.

Email: henry.praherdhiono.fip@um.ac.id

ORCID: <https://orcid.org/0000-0002-5922-7491>

Yoel Umbu Runga Riti, is a doctoral student at the Instructional Technology, Universitas Negeri Malang, Indonesia. He also earned his Master's degree in the same field. He lectures in the Department of Christian Religious Education, Faculty of Teacher Training and Christian Education, at the Institut Agama Kristen Negeri Kupang, Indonesia.

Email: yoel.umbu.2201219@students.um.ac.id

ORCID: <https://orcid.org/0009-0001-0435-3108>

Johana Manubey, is a doctoral student at the Instructional Technology, Universitas Negeri Malang, Indonesia. She also earned her Master's degree in the same field. She lectures in the Department of Christian Religious Education, Faculty of Teacher Training and Christian Education, at the Institut Agama Kristen Negeri Kupang, Indonesia.

Email: johana.manubey.2301219@students.um.ac.id

ORCID: <https://orcid.org/0000-0002-6484-4697>

Denissa Alfiany Luhulima, is a doctoral student at the Instructional Technology, Universitas Negeri Malang, Indonesia. She also earned her Master's degree in the same field. She lectures in the Department of Educational Technology, Faculty of Christian Education, at the Institut Agama Kristen Negeri Ambon, Indonesia.

Email: denissa.alfiany.2501219@students.um.ac.id

ORCID: <https://orcid.org/0009-0000-2904-8620>

Publisher's Note: *The opinions, statements, and data presented in all publications are solely those of the individual author(s) and contributors and do not reflect the views of Universitepark, EDUPIJ, and/or the editor(s). Universitepark, the Journal, and/or the editor(s) accept no responsibility for any harm or damage to persons or property arising from the use of ideas, methods, instructions, or products mentioned in the content.*
