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# Translating Knowledge into Innovative Teaching: A Systematic Mixed-Method Review of Gamified Flipped Classrooms

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**Abstract**

Gamified Flipped Classroom which is another variation of Flipped Classroom is underexplored. Successful results and insights from studies have not yet been fully translated into practical classroom applications. Another gap identified in the literature is the absence of systematic reviews that focus on gamified flipped classrooms using a mixed-methods design. This systematic review seeks to: (1) identify common mixed-method designs employed, (2) analyze the gamified tools and elements incorporated, (3) explore the theoretical frameworks underpinning these studies, and (4) investigate the variables examined. The review includes publications from 2023 to 2024. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, a total of 203 articles were screened from databases including Science Direct, Knimbus, Eric and Google Scholar, of which seven met the inclusion criteria for comprehensive analysis. Seven articles were included in the review. The findings reveal a diverse application of mixed methods designs in GFC research, with a predominant focus on quantitative approaches. Common gamified tools and elements include points, badges, leaderboards, and interactive quizzes, which are integrated to enhance student motivation and engagement. Theoretical frameworks such as Self-Determination Theory and Constructivist Learning Theory are frequently employed to underpin GFC studies. Variables examined encompass student motivation, engagement, academic performance, and satisfaction. Furthermore, this review provides valuable insights into the current state of GFC research, highlighting effective strategies and areas for future exploration.

**Keywords:** Gamified Flipped Classrooms, Mixed Method , Systematic Review

## Introduction

One of the United Nations' seventeen Sustainable Development Goals is to promote Sustainable Education, ensuring access to quality education and lifelong learning opportunities for all (United Nations, 2016). Considering this goal, teachers are increasingly driven to integrate technology in educational settings, prompting continuous innovation in teaching practices to enhance student engagement and learning outcomes. The gamified flipped classroom, which combines digital tools with interactive learning strategies, exemplifies such innovation and has gained significant attention for its potential to promote inclusive quality education (Bishop & Verleger, 2013; Hamari et al., 2016).

Gamified Flipped classroom is a variation of flipped classroom model. In a flipped classroom, lessons are delivered outside of school hours—usually through digital platforms allowing students to study the lessons in their own pace. Classroom time is then repurposed for interactive, hands-on activities that deepen understanding and foster a more engaging, learner-centered environment (Bergmann & Sams, 2012).Teacher-made videos can also be used to deliver these lessons to minimize cognitive load among students (Ofril et. al., 2024).

On the other hand, gamification is the integration of game-design elements like points, badges, and leaderboards to boost student motivation and engagement. These elements introduce a dynamic component to learning, transforming it into a more interactive and enjoyable experience (Deterding et al., 2011). When these gamification strategies are integrated with the flipped classroom approach, the synergy created has been found to substantially improve academic outcomes, making learning not just more effective but also inherently rewarding (Huang & Hew, 2018; Subhash & Cudney, 2018).

This variation of the flipped classroom model aims to foster a more engaging, interactive learning environment, inviting a reevaluation of its effectiveness and optimization through empirical research (Zainuddin & Halili, 2016; Subhash & Cudney, 2018).

However, there is limited research on gamified flipped classrooms, and the successful results and insights from these studies have not yet been fully translated into practical classroom applications. This represents a key gap addressed

in this research. The study aims to bridge the gap between theoretical knowledge and practical application, ensuring that this educational innovation benefits both students and teachers (Gonzalez & Area, 2021; Creswell & Plano Clark, 2017; Johnson, Onwuegbuzie, & Turner, 2007). Another gap identified in the literature is the absence of systematic reviews that focus on gamified flipped classrooms using a mixed-methods design. Existing systematic reviews typically include only quantitative designs or qualitative (Smith et al., 2022; Ekici, 2021), but not in a mixed-methods approach.

This systematic review investigates studies on gamified flipped classrooms that employ mixed-methods design. The rationale for including studies with this design is that it strengthens the robustness of the research and validates the findings through cross-referencing quantitative and qualitative data. The review seeks to: (1) identify common mixed-method designs employed, (2) analyze the gamified elements incorporated, (3) explore the theoretical frameworks underpinning these studies, and (4) investigate the variables examined. Additionally, this review aims to guide researchers in replicating mixed methodologies for studies on gamified flipped classrooms and to identify research gaps, such as unexplored theories, frameworks, or variables related to this topic.

## Methodology

A systematic review was performed to comprehensively assess studies published between 2023 and 2024 on gamified flipped classrooms using a mixed-method design. This approach was selected for its efficiency in addressing the research question and offering a swift response (Kalogiannakis, Papadakis & Zourmpakis, 2021). Moreover, systematic reviews guarantee valid and reliable outcomes by rigorously evaluating and choosing only top-quality studies based on stringent inclusion and exclusion criteria. The methodology consisted of two primary stages: planning and conducting, followed by reporting the results (see figure 1).


Figure 1. Stages of Systematic Review

## Research Questions

The study aims to systematically investigate gamified flipped classroom studies that utilize both quantitative and qualitative research designs. Specifically, it aims to answer the following questions:

1. What mixed-method research designs are used in the gamified flipped classroom studies?
2. What tools, environments, and specific elements of gamification are used in the studies?
3. What theoretical frameworks are anchored in these studies?
4. What variables are investigated in these studies?

The review protocol during the planning phase includes a database searched on Knimbus, Google Scholar, Science Direct, and the Education Resources Information Center (ERIC). These databases were chosen for their relevance to education and ease of access. The publication period was limited to 2023-2024 to ensure the retrieval of current and pertinent information. Only articles originally published in English were considered to avoid the potential biases and inaccuracies arising from translated texts. (See Table 1 for inclusion criteria).

Table 1**. Inclusion Criteria**

| | |
|---|---|
| **Databases** | Knimbus, Science Direct, ERIC, Google Scholar |
| **Search Strategy** | For Knimbus (topic, title, abstract and keywords), Science Direct (topic, title, abstract and keywords), ERIC (topic, title, abstract and keywords), Google Scholar |
| **Search Range** | 2023-2024 |
| **Document Type** | Articles |
| **Language** | English |

A search strategy was developed which included synonyms to broaden the scope: gamification, use of games, gamified, flipped learning, flipped classroom, and mixed method. Boolean operators AND and OR were used to connect different concepts and synonyms, while quotation marks ensured accurate retrieval of articles. The search string ("gamification" OR "use of games" OR "gamifying" OR "gamified") AND ("flipped learning" OR "flipped learning environment" OR "flipped classroom" OR "flipped") AND ("mixed method") were crafted to find relevant studies on gamified flipped classrooms efficiently
.

Articles were selected using the PRISMA framework (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to ensure their relevance to the research topic. Numerous articles were excluded because they did not meet the inclusion criteria. These articles either focused solely on gamification or flipped classrooms, or used only a qualitative approach, rather than employing a mixed-methods design. Furthermore, review articles, meta-analyses, and meta-synthesis papers were also omitted. The articles that remained were organized in Microsoft Excel to remove any duplicates. The articles that remained with this filtration were then subject to a thorough quality assessment. The search string was crafted specifically to identify studies that examine any aspect of gamification and flipped learning, particularly those employing a mixed-method approach.

| | | |
|---|---|---|
| | **Databases that were searched** | |
| **Identification** | Science Direct | 63 |
| | Knimbus | 12 |
| | Eric | 23 |
| | Google Scholar | 105 |
| | Total records of articles identified | 203 |
| | Analysis of abstracts | 50 |
| | Articles excluded | 153 |
| | Articles that remained for the review | 36 |
| **Screening** | Duplicates removed | 3 |
| | Articles that remained for quality evaluation | 33 |
| **Eligibility** | Articles with low qualities removed | 26 |
| | Articles included in the systematic review | **7** |

**Figure 2: PRIMSMA Flowchart used for a Search Protocol**

For quality evaluation of articles, a checklist was used to evaluate articles based on the relevance to the research questions. Articles were scored using a three-tier system: "Yes" for fully meeting the criteria , "Partial" for meeting some of the criteria, and "No" for not meeting the criteria. Articles that did not sufficiently meet the criteria were rigorously filtered out, resulting in the exclusion of 26 articles. Seven articles were then reviewed by three evaluators. The data they extracted were then compared, and any differences were debated and resolved. (Brunton et al., 2020).

**Results and Discussion**

**RQ1. Key Methodological Aspects and Designs in Studies on Gamified Flipped Classrooms**

The seven articles were published across seven different journals. One study was published in Education and Technology journals (Tang, 2023). Two appeared in Language and Second Language Education journals (Pratiwi et al., 2024; Nilubol, 2023). One study was published in a Nursing and Healthcare Education journal (Chang, Kim & Kim ,2024), one in a Higher Education and Human Behavior journal (Arsyad, Waluyo & Maisarah ,2024) , one in an

Engineering Education journal (Priyaadharshini & Maiti, 2023), and one in a Sustainability and Business Education journal (Hsu & Wu, 2023).

The analysis highlights the diverse methodological designs employed in these studies. Table 5 summarizes the mixed-method designs used, the types of quantitative and qualitative data collected, and the integration details.

**Table 2.** Summary of Mixed Methods Designs

| Study | Mixed Methods Design | Quantitative Data | Qualitative Data | Integration Details | References |
|---|---|---|---|---|---|
| 1 | Convergent Parallel | pretest-posttest | Self-reflection journals | Data collected simultaneously, analyzed separately, results compared | Chang et al. (2024) |
| 2 | Explanatory-Sequential | pretest-posttest | Teachers' guided reflection | Initial quantitative analysis followed by qualitative insights from guided reflection | Pratiwi et al. (2024) |
| 3 | Explanatory-Sequential | Surveys, questionnaires, pretests, posttests | Semi-structured interviews, observations | Quantitative data collection and analysis precede qualitative data to provide contextual understanding | Nilubol (2023) |
| 4 | Explanatory-Sequential | TOEFL pretest/posttest, surveys | Students' reflective essays | Quantitative results are expanded upon with qualitative essays | Arsyad et al. (2024). |
| 5 | Concurrent Embedded | Learning analytics, assessment scores | Student feedback questionnaires | Qualitative feedback embedded within a larger quantitative framework | Priyaadharshini & Maiti (2023) |
| 6 | Convergent Parallel | pretest-posttest | Systematic reviews, case studies | Simultaneous data collection and separate analysis with comparative integration | Tang (2023) |
| 7 | Explanatory-Sequential | pretest-posttest, questionnaires | Semi-structured interviews | Quantitative analysis followed by qualitative interviews | Hsu & Wu, 2023 |

The analysis of the seven studies reveals diverse applications of mixed-method research designs, tailored to achieve robust and comprehensive results. Three distinct designs were employed: Convergent Parallel Mixed-Method Design (Studies 1 and 6), Explanatory-Sequential Mixed-Methods Design (Studies 2, 3, 4, and 7), and Concurrent Embedded Mixed-Method Design (Study 5). Each design integrated quantitative and qualitative data to address complex research objectives, with varying approaches to data collection, analysis, and integration.

Two out of the seven studies used Convergent Parallel Mixed-Method Design (Studies 1 and 6). Study 1 utilized pretest-posttest assessments for quantitative data, complemented by self-reflection journals for qualitative data. Both datasets were collected simultaneously, analyzed separately, and integrated by comparing results to identify complementary or conflicting findings (Chang et al., 2024). Study 6 also employed pretest-posttest assessments but supplemented these with systematic reviews and case studies for qualitative data. The concurrent collection of data provided a broad understanding of outcomes, and the comparative integration allowed for the triangulation of findings (Tang, 2023). This design's simultaneous data collection and independent analysis offer the advantage of validating findings through triangulation. The ability to compare datasets makes this design particularly effective for identifying complementary findings and ensuring result consistency.

Four of the reviewed studies utilize Explanatory-Sequential Mixed-Methods Design (Studies 2, 3, 4, and 7). Study 2 began with a pretest-posttest to collect quantitative data and followed up with teachers' guided reflections to provide qualitative insights. The reflections enriched the understanding of the intervention's effects on teaching practices (Pratiwi et al., 2024). Study 3 used surveys, questionnaires, and pretest-posttest assessments for quantitative data, followed by semi-structured interviews and observations for qualitative data. This design enabled researchers to contextualize numerical findings with real-world experiences (Nilubol, 2023). Study 4 collected quantitative data using TOEFL pretest-posttest assessments and surveys, which were expanded upon by students' reflective essays. The qualitative data provided a deeper understanding of the language-learning process and student engagement (Arsyad et al., 2024). Study 7 utilized pretest-posttest assessments and questionnaires for quantitative data, followed by semi-structured interviews to explain and contextualize the observed trends in student performance and perception (Hsu & Wu, 2023).
This was the most commonly employed design, reflecting its effectiveness and convenience in educational research. Researchers could establish baseline trends and outcomes starting with quantitative data collection and analysis, which were then enriched by qualitative data to uncover the underlying mechanisms or contextual factors. The sequential nature of this design ensures that qualitative data are focused on explaining or expanding upon the quantitative results, creating a coherent narrative.

The Concurrent Embedded Mixed-Method Design employed in Study 5 centered on using learning analytics and assessment scores as the primary quantitative data, with qualitative student feedback questionnaires integrated within the larger framework. This approach allowed qualitative insights to enhance the primary quantitative findings by providing contextual understanding from students' perspectives (Priyaadharshini & Maiti, 2023).

This innovative design allowed the study to maintain a clear focus on the quantitative data while offering valuable qualitative insights that complemented the results. Embedding the feedback within the larger quantitative framework, the study minimized complexity while gaining a deeper understanding of students' perceptions of the intervention's effectiveness. The qualitative data provided clarity on how students experienced and perceived the intervention, enriching the overall analysis without diverting from the core quantitative measures. This design proves particularly useful in situations where qualitative data adds depth and context without overshadowing the primary research focus.

The seven studies employed diverse mixed method designs to address their respective research questions. The choice of design significantly contributed to the robustness of the studies, ensuring that their findings were both valid and comprehensive. While the Explanatory-Sequential Mixed-Methods Design was the most frequently used, the selection of a design depends on the objectives and research questions of each study. The integration of quantitative and qualitative data enhanced the overall validity and reliability of the research, providing nuanced insights into the impact of gamified flipped classrooms. Additionally, the mixed-method designs used were also easy to replicate, making them practical for future researchers aiming to build on these findings.

These studies offer valuable contributions to educational research with leveraging mixed-method approaches. This highlights the importance of aligning methodological choices with research goals to capture the multifaceted nature of teaching and learning.

**RQ2. Tools and Environments Gamified Flipped Classrooms**

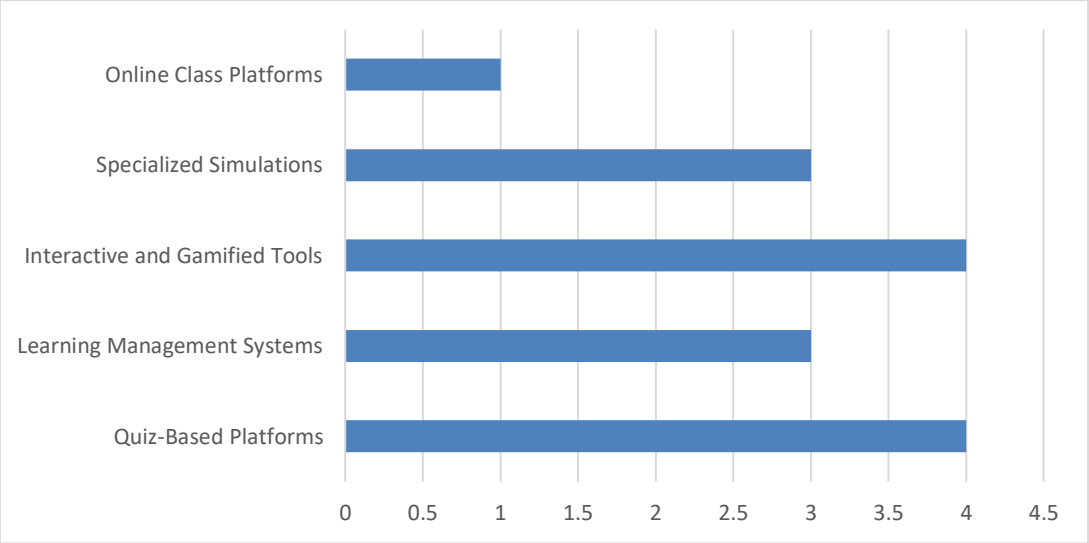


**Figure 3. Overview of Gamified Flipped Classroom Tools and Environment Across Studies**

Figure 3 illustrates the diverse range of gamified flipped classroom tools employed across seven research studies, grouped into five key categories: Online Class Platforms, Quiz and Gamification Tools, Learning Management Systems (LMS), Intelligent Tutoring Systems (ITSs), and Simulation Applications. Each category significantly contributes to fostering an engaging, interactive, and personalized learning environment.

Online Class Platforms played a crucial role in managing virtual classrooms and ensuring effective communication. For instance, Study 1 utilized Padlet for content sharing and a Simulation Center to promote hands-on engagement (Chang et al., 2024). Similarly, Study 7 employed Microsoft Teams to streamline communication and enhance collaboration, underlining the importance of reliable platforms to maintain the integrity of virtual classrooms (Hsu & Wu, 2023). These tools facilitate real-time interaction, feedback, and community-building, which are fundamental for supporting student learning in digital environments.

Quiz and Gamification Tools proved vital for student motivation and active learning. Tools such as Quizlet were used in Study 2 for vocabulary building (Pratiwi et al., 2024), and Kahoot! and Quizizz were integral to interactive quizzes in Studies 4 and 5 (Arsyad et al., 2024; Priyaadharshini & Maiti, 2023). These tools allow students to actively engage with the content in a competitive and enjoyable way, driving motivation and reinforcing learning. Furthermore, Socrative facilitated formative assessments across studies, offering real-time insights into student progress. Study 6 incorporated Dragon Box, an educational game designed to foster math learning, illustrating how thematic games can enhance subject-specific learning (Tang, 2023).

The use of Learning Management Systems (LMS) helped streamline course management and monitor student performance. Study 5 combined Moodle with Kahoot!, integrating traditional LMS functionalities with interactive elements (Priyaadharshini & Maiti, 2023), while Study 6 and Study 7 used platforms like Blackboard and Canvas to manage course content effectively (Tang, 2023; Hsu & Wu, 2023). These systems provide a centralized location for course materials, assessments, and student progress, supporting teachers in maintaining an organized and efficient learning environment.

Intelligent Tutoring Systems (ITSs) were leveraged to provide personalized, adaptive learning experiences. In Study 6, Carnegie Learning and ALEKS were utilized to deliver customized math and STEM content, adjusting to students' learning speeds and individual needs (Tang, 2023). ITSs help enhance student comprehension by adapting the

curriculum to match learners' current understanding, allowing for targeted interventions and reinforcing concepts that need further attention.

Simulation Applications were used to create immersive learning environments that allowed students to apply theoretical knowledge in real-world scenarios. Study 1 employed a Simulation Center (Chang et al., 2024), and Study 7 incorporated the CEMO Simulation app (Hsu & Wu, 2023), providing students with practical, hands-on experiences in controlled, risk-free settings. These tools bridge the gap between theory and practice, fostering experiential learning and improving retention by enabling students to engage with content in a simulated context.
The integration of these diverse tools demonstrates the multifaceted nature of gamified flipped classrooms and their potential for enhancing learning outcomes. The combination of interactive platforms, adaptive learning technologies, and practical simulations creates a dynamic and personalized learning environment that engages students, motivates them, and tailors the learning experience to their needs.

For educators, this integrated approach offers a robust framework for creating engaging and effective learning experiences that cater to diverse learning styles. The tools highlighted in the studies contribute to enhancing student engagement, active participation, and real-time feedback, all of which are vital for promoting deeper learning. Additionally, the use of gamification and personalization helps sustain student interest and motivation, addressing the challenge of disengagement often seen in traditional classrooms.

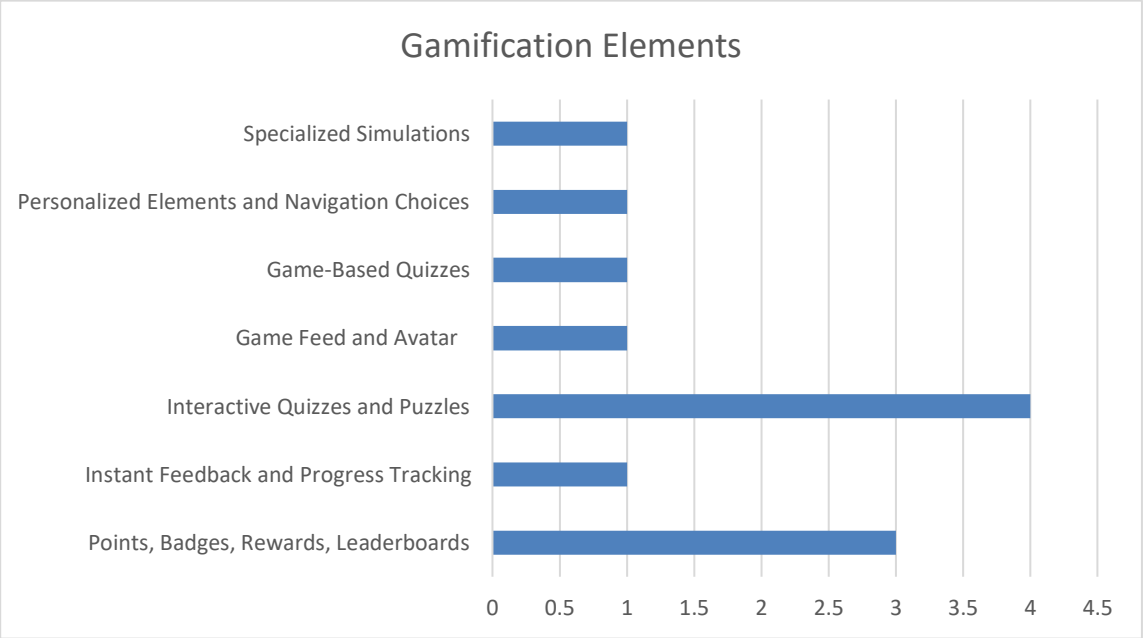


**Figure 4. Distribution of Gamification Elements Across Studies**

Figure 4 illustrates the distribution of gamification elements, showcasing the varied and strategic use of these tools in gamified flipped classroom studies. Each element serves a specific purpose in enhancing student engagement and improving learning outcomes.

Points, Badges, Rewards, and Leaderboards were featured prominently in Studies 3 and 4, these elements are recognized for their effectiveness in boosting motivation and creating a competitive atmosphere among students (Nilubol, 2023;Arsyad et al., 2024). In addition, these are integral components of gamification, as they tap into students' intrinsic and extrinsic motivation. These two studies emphasize their effectiveness in fostering competition, motivation, and engagement. Points provide immediate feedback on performance, while badges signify achievements, offering students a sense of accomplishment. Leaderboards introduce a competitive aspect, encouraging students to strive for higher ranks, which boosts participation and sustained effort. The use of these elements in education can enhance learning by transforming mundane tasks into rewarding activities. However, overemphasis on competition may lead to anxiety or alienation for students who consistently perform poorly. To address this, a balance must be maintained between competitive and cooperative gamified strategies, such as

incorporating team-based leaderboards or rewards for collaborative efforts. Educators can use these tools to cultivate a growth mindset, emphasizing progress over rank.

Feedback and Progress Tracking: Study 2 employed a holistic approach by integrating instant feedback and progress tracking with traditional motivators like points and leaderboards. This combination forms a comprehensive system that supports ongoing assessment and immediate feedback, crucial for reinforcing learning dynamically (Pratiwi et al., 2024). This highlights the importance of integrating instant feedback and progress tracking with traditional gamified elements like points and leaderboards. Feedback serves as a powerful tool for reinforcing correct actions and guiding students toward improvement, while progress tracking enables learners to visualize their growth over time. Together, these features provide a dynamic learning environment where students can adapt their strategies to achieve better outcomes. Instant feedback and progress tracking are essential for fostering a formative assessment culture, where learning is a continuous and adaptive process. These features can improve self-regulation, as students become more aware of their strengths and weaknesses. For educators, leveraging these systems provides valuable data to personalize instruction. However, the complexity of integrating these tools requires careful planning, particularly in aligning them with curriculum goals and technological infrastructure.

Interactive Quizzes and Puzzles: These elements play a key role in promoting active learning and participation which are central to Studies 1, 3, 4, and 5 (Chang et al., 2024; Nilubol, 2023; Arsyad et al., 2024; Priyaadharshini & Maiti, 2023). Study 6 introduced innovative gamification strategies, including performance-contingent incentives and personalized agents, such as allowing students to choose a game character. These features cater to individual learning preferences and enhance personal engagement by adapting to different learning styles (Tang, 2023).
These four studies underline the role of interactive quizzes and puzzles in promoting active learning and participation. These gamified activities require students to apply critical thinking and problem-solving skills, making learning more engaging and hands-on. Study 6 (Tang, 2023) takes this further by introducing performance-contingent incentives and personalized agents, such as allowing students to select game characters, which cater to individual preferences and learning styles. Interactive quizzes and puzzles encourage deeper cognitive engagement and foster active participation, which are critical for knowledge retention. Personalized gamification elements, such as character choice, can enhance intrinsic motivation by making learning experiences more relatable and enjoyable. However, their implementation demands thoughtful design to ensure alignment with educational objectives. Additionally, inclusivity should be prioritized to accommodate diverse learning needs and prevent disengagement among students who may not resonate with certain gamified activities.

Game Feeds and Avatars: Utilized in Study 3, game feeds and avatars, combined with traditional gamification tools and interactive elements, create a vibrant and interactive learning environment. Study 5 highlighted the effectiveness of game-based quizzes and leaderboards, accompanied by consistent feedback and rewards, in maintaining student interest and encouraging active participation (Nilubol, 2023). Game feeds and avatars, as employed in Study 3 (Nilubol, 2023), create an immersive and interactive learning environment by providing real-time updates and personalizing the experience for students. Study 5 further demonstrates how the combination of game-based quizzes, leaderboards, consistent feedback, and rewards maintains student interest and promotes active participation. These elements make learning environments dynamic and relatable, mimicking popular digital platforms students are familiar with. Using avatars and game feeds, educators can create a more engaging and personalized learning experience that caters to students' affinity for digital interaction. This approach also helps bridge the gap between formal education and students' digital lives, fostering greater motivation. However, over-reliance on such features may overshadow core learning objectives if not implemented thoughtfully. Educators must ensure that gamification enhances learning rather than merely entertaining students.

Cross-border e-Commerce Marketing and Operating Simulation (CEMO Simulation): Study 7 implemented a specialized Cross-border e-Commerce Marketing and Operating Simulation (CEMO Simulation), offering a practical and immersive learning experience relevant to real-world scenarios. This simulation not only deepens students' understanding but also prepares them for real market challenges, demonstrating the practical advantages of gamified learning environments (Hsu & Wu, 2023). Study 7 introduces the CEMO Simulation, a practical tool that immerses students in real-world scenarios related to cross-border e-commerce. This simulation offers experiential learning, allowing students to develop skills in marketing, operations, and decision-making within a gamified context. Such simulations bridge theoretical knowledge and practical application, preparing students for real-world challenges. The CEMO Simulation highlights the potential of gamified learning environments to deliver hands-on, career-relevant training. By simulating real-world challenges, students develop transferable skills that are directly applicable in professional settings. However, the development and implementation of such simulations require significant resources, expertise, and collaboration with industry partners. Additionally, ensuring that the gamified elements align with educational standards is essential to maximize learning outcomes.

Generally, these gamified elements are effective and can enhance flipped classrooms, but their success depends on resource accessibility and teacher preferences. Advanced tools like simulations and avatars thrive in well-resourced settings, while simpler elements such as points, badges, and leaderboards are practical in resource-limited environments. Teacher preference also plays a key role, as some educators may embrace interactive tools, while

others prefer straightforward methods like quizzes and rewards that align with their teaching style and time constraints. Flexible and adaptable integration of these elements is essential to ensure they suit the available resources and individual teacher preferences, maximizing their impact on engagement and learning outcomes.

**RQ3. Theoretical Frameworks in Studies on Gamified Flipped Classrooms**

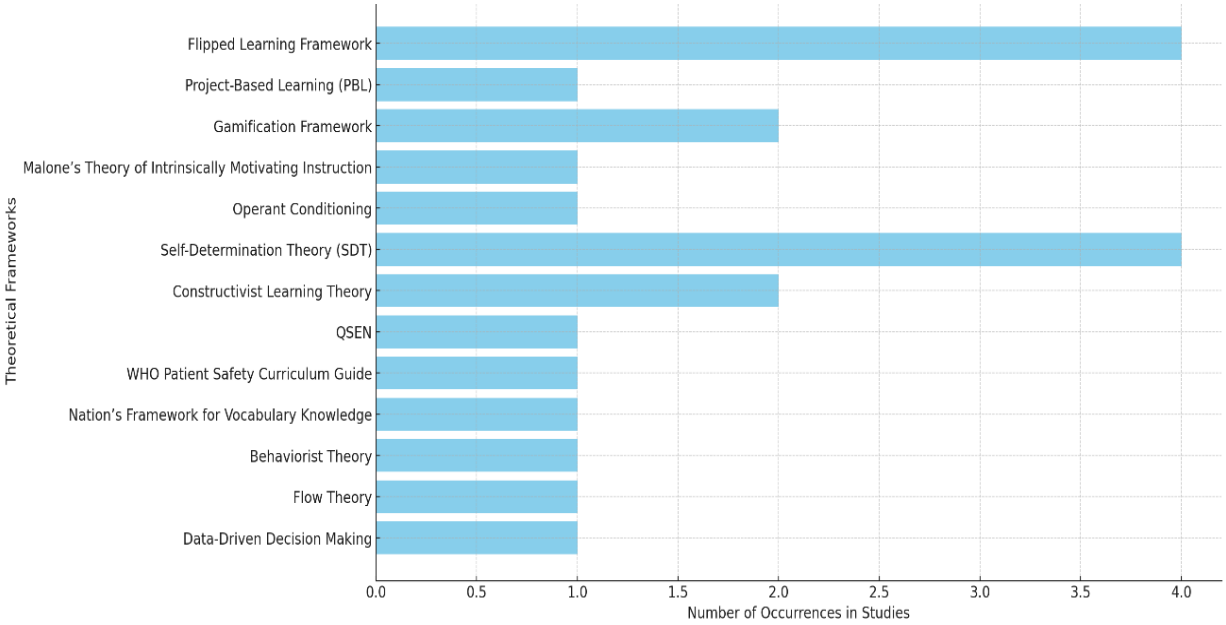


**Figure 5 Theoretical Frameworks Utilized in Studies**

Figure 5 illustrates a comprehensive analysis of the theoretical frameworks utilized across seven distinct studies, demonstrating a strong alignment with educational theories that prioritize active learning, engagement, motivation, and the practical application of knowledge. A predominant theme is the adoption of the Flipped Learning Framework in Studies 1, 2, 4, and 7. This approach enhances active and engaged learning by encouraging students to independently explore content before engaging in interactive, in-class activities. This method is often paired with Project-Based Learning (PBL) strategies, notably in Study 7, where real-world challenges are woven into the curriculum to foster hands-on learning experiences.

Additionally, the role of gamification is critical in heightening student motivation and engagement, with the Gamification Framework being implemented in Studies 1 and 4. This strategy introduces game mechanics, such as points and leaderboards, to make learning more interactive and enjoyable. Supporting this, Malone's Theory of Intrinsically Motivating Instruction in Study 3 suggests that learning activities should incorporate challenge and curiosity elements to maintain intrinsic motivation. The Behavioral Theory of Operant Conditioning from the same study uses reinforcements to encourage desired learning behaviors.

Self-Determination Theory (SDT), evident in Studies 1, 2, 3, and 5, emphasizes the significance of nurturing autonomy, competence, and relatedness to boost intrinsic motivation and proactive engagement among students. This theory complements the Constructivist Learning Theory observed in Studies 2 and 5, which promotes a learner-centered paradigm where students construct their understanding through reflective experiences.

Specific educational frameworks, such as the Quality and Safety Education for Nurses (QSEN) and the WHO Patient Safety Curriculum Guide in Study 1, address targeted competencies in nursing education, focusing on patient safety and quality care. Similarly, the Nation's Framework for Vocabulary Knowledge in Study 2 offers a systematic approach to vocabulary learning, adapting theoretical frameworks to meet specific educational needs.

Behavioral and cognitive theories also play significant roles, with Behaviorist Theory in Study 5 examining how environmental factors influence behavior through reinforcements, and Flow Theory in Study 1 promoting deep engagement and immersion in learning activities. Furthermore, the integration of Data-Driven Decision Making in

Study 5 underscores the importance of leveraging empirical data to refine educational strategies, ensuring that teaching methods are tailored to enhance student learning outcomes effectively.

Overall, this analysis stresses a dynamic approach to addressing traditional educational challenges and adapting to modern educational demands. These frameworks are strategically combined to prepare students for real-world scenarios, promoting dynamic, interactive, and student-centered learning environments. This thematic integration signifies a broader trend towards more engaging, motivating, and practical educational methodologies across various academic disciplines.

**RQ4. Variables Investigated in the Studies**

Five studies identify motivation as a pivotal factor driving student engagement, performance, and overall learning outcomes. Higher motivation correlates with improved academic results and more positive learning attitudes. Motivation is essential for driving student engagement and academic success, with studies showing that higher motivation leads to better performance and more positive attitudes toward learning. Educators can leverage gamified elements like points, badges, and leaderboards to initially engage students and build motivation, while gradually fostering intrinsic motivation by connecting lessons to students' interests and real-world applications (Chang et al., 2024; Nilubol, 2023; Arsyad et al., 2024; Priyaadharshini & Maiti, 2023; Tang, 2023). Additionally, creating a supportive classroom environment that celebrates progress, provides constructive feedback, and nurtures a growth mindset can help maintain and enhance motivation. Personalizing motivational strategies to individual student needs ensures that diverse learning preferences are addressed, promoting sustained engagement and improved learning outcomes. Educators can effectively empower students and foster long-term academic success through combining external rewards with intrinsic motivational strategies,

One study demonstrates enhancements in collective efficacy and patient safety competency, attributed to targeted training programs. This highlights the impact of specialized training on performance and confidence (Chang et al., 2024). This study demonstrates that targeted training programs significantly enhance collective efficacy and patient safety competency, emphasizing the positive impact of specialized, focused learning. Tailoring training to address specific competencies, educators can strengthen learners' performance and build confidence, allowing them to apply skills effectively in real-world situations. This highlights the importance of designing training programs that not only focus on competency development but also foster a collaborative environment where learners feel empowered to contribute to group success. Such approaches ensure that learners are prepared to meet both individual and collective challenges in their professional roles.

Three studies emphasize that active engagement and the promotion of higher-order thinking skills are vital for academic success, with enhanced engagement contributing to a deeper understanding and sustained interest in learning (Chang et al., 2024; Tang, 2023; Hsu & Wu, 2023). Fostering environments that encourage critical thinking, problem-solving, and active participation, educators can help students retain knowledge more effectively and cultivate a lasting passion for learning. These findings underscore the importance of moving beyond rote memorization and promoting interactive, thought-provoking activities that engage students cognitively, leading to improved academic outcomes and long-term intellectual growth.

Three studies investigate academic performance and learning outcomes (Arsyad et al., 2024; Tang, 2023; Hsu & Wu, 2023). Various factors, including student motivation, engagement, and teaching methodologies, play a critical role in enhancing these variables which focus on the need for a holistic educational approach A well-rounded approach that integrates motivational strategies, interactive teaching methods, and active engagement ensures that students are not only prepared to learn but are also motivated to invest in their education. Addressing these interconnected factors, educators can create an environment that supports both cognitive and emotional development, ultimately improving overall academic success and fostering a deeper, more meaningful learning experience for students.

Personalized education is greatly enhanced by recognizing and nurturing student autonomy and cognitive traits, as it allows for tailored learning experiences that meet individual needs (Nilubol, 2023; Priyaadharshini & Maiti, 2023). Understanding how students learn, including their pace and preferred methods, educators can adapt their teaching strategies to maximize each learner's potential. This approach is especially beneficial for students who may require additional support or different learning pathways, ensuring they are not left behind. Promoting autonomy within this personalized framework encourages students to take ownership of their learning, fostering a sense of responsibility and boosting overall academic performance.

From these results, researchers can further explore other variables or use a combination of the identified factors—such as student motivation, engagement, autonomy, cognitive traits, and teaching methodologies—to build upon existing studies in gamified flipped classrooms. By integrating these variables, researchers can examine how they interact and influence each other within the context of a gamified flipped learning environment. For example, they could investigate how student autonomy and motivation combined with tailored teaching strategies enhance

engagement and academic performance. Additionally, exploring how cognitive traits, such as problem-solving abilities, intersect with gamified elements could provide deeper insights into how these elements support diverse learning styles. This approach would allow researchers to fill gaps in the current understanding of how various factors work together to optimize learning outcomes in gamified flipped classrooms. Such studies could lead to more nuanced, evidence-based strategies for designing and implementing gamified flipped classrooms that cater to the diverse needs of students.

The use of mix-method design in gamified flipped classrooms has add legitimacy to the effectiveness of gamified flipped classrooms. The findings from this systematic review like common tools, environment and elements has offered insights on the effectivity of integrating these in the actual classrooms.

The actionable strategies delineated in this section are directly derived from the comprehensive findings of this systematic review on gamified flipped classrooms. This review, grounded in rigorous methodologies and robust theoretical frameworks, evaluated the effectiveness and practical challenges of gamification and flipped classroom strategies, informing the development of both a teacher training workshop and a student engagement toolkit.

The "Enhancing Student Engagement through Gamified Flipped Classrooms" workshop is specifically tailored to equip educators with the insights and skills necessary to implement and scale successful gamification strategies highlighted by our review. Structured across five detailed sessions, the workshop introduces core principles, offers hands-on implementation practice, and discusses assessment and feedback techniques that align with the successful approaches identified in our study. Each session builds on empirical evidence from the review, ensuring that educators not only understand the theoretical underpinnings but also how to apply these effectively in diverse classroom settings.

Simultaneously, the "Gamified Learning for Mathematics" toolkit translates the review's empirical evidence into practical tools that educators can use to enhance student engagement. It includes a variety of resources, such as pre-class quizzes, interactive in-class games, and post-class reflective tools, all designed based on successful models from our systematic review. This toolkit supports educators in creating engaging and effective learning environments by providing step-by-step guides, customizable templates, and best practices for integrating gamified elements into the learning process.

By meticulously translating the systematic review's findings into these practical educational resources, we aim to bridge the gap between theoretical research and classroom application. This approach leverages the documented benefits of gamified flipped classrooms to enhance educational quality and student outcomes, empowering educators with the tools to implement these innovative strategies effectively.

**Conclusion**

Based on the findings of this systematic review, the following conclusions can be drawn:

RQ1. The seven studies utilized three distinct research designs: Convergent Parallel Mixed-Methods Design, Explanatory-Sequential Mixed-Methods Design, and Concurrent Embedded Mixed-Methods Design. Among these, the Explanatory-Sequential Mixed-Methods Design was the most employed. Future research could replicate these studies in different contexts to expand their applicability.

RQ2. The studies commonly utilized online class platforms, gamification tools, learning management systems (LMS), intelligent tutoring systems (ITSs), and simulation applications. Platforms like Padlet and Microsoft Teams facilitated communication and engagement, while quiz tools like Quizlet, Kahoot!, and Quizizz boosted motivation through interactive, competitive learning. LMS such as Moodle, Blackboard, and Canvas streamlined course management and tracked student progress. ITSs like Carnegie Learning and ALEKS provide personalized, adaptive learning experiences. Simulation tools, including the Simulation Center and CEMO Simulation, offered practical, hands-on applications of theoretical knowledge. Together, these elements created a dynamic and engaging learning environment. Educators may integrate these tools and game-like elements according to their preferences and personalize gamified flipped activities according to students needs.

RQ3. The studies analyzed demonstrate a strong alignment with educational theories focused on active learning, engagement, and motivation. The Flipped Learning Framework was prominently featured in several studies, paired with Project-Based Learning to encourage interactive and hands-on experiences. Gamification, supported by Malone's Theory and Operant Conditioning, played a critical role in enhancing student motivation through elements like points and leaderboards. Additionally, Self-Determination Theory and Constructivist Learning Theory emphasized the importance of autonomy and reflective learning in fostering intrinsic motivation. The integration of specific frameworks, such as QSEN for nursing and the Nation's Framework for Vocabulary Knowledge, addressed targeted competencies. Behavioral and cognitive theories, including Flow Theory and Data-Driven Decision Making, further

enriched the learning process, ensuring that teaching strategies are tailored to enhance student engagement and outcomes.

RQ4. The studies on gamified flipped classrooms identified motivation, student efficacy, engagement, and academic performance as key variables. Future research could explore additional variables to further understand the impact of the Gamified Flipped Classroom model.

Overall, integrating mixed method designs into gamified flipped classrooms has enhanced their credibility and effectiveness. This systematic review identifies common tools, environments, and elements, providing insights into their practical application in actual classrooms. Educators and researchers can utilize these insights to develop training workshops for teachers planning to implement gamified flipped classrooms.
This workshop will be specifically tailored to equip educators with the insights and skills necessary to implement and scale successful gamification strategies highlighted by our review. Structured across five detailed sessions, the workshop introduces core principles, offers hands-on implementation practice, and discusses assessment and feedback techniques that align with the successful approaches identified in this study. Each session builds on empirical evidence from the review, ensuring that educators not only understand the theoretical underpinnings but also how to apply these effectively in diverse classroom settings.

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