

# Gamification in Secondary Education: A Systematic Synthesis of Contemporary Research

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## ABSTRACT

This article provides an extensive review of peer-reviewed studies to explore the implementation, effectiveness, and broader implications of gamification within secondary education. It addresses the theoretical underpinnings, empirical findings, practical uses, and challenges encountered when applying gamification at this educational stage. The compiled research generally indicates positive effects on student motivation, engagement, and learning outcomes, with particularly notable benefits observed among at-risk groups, such as immigrant students and those with learning difficulties like dyslexia. Effect sizes reported vary from moderate to large; however, some studies show only partial improvements, suggesting that success depends on factors including the quality of implementation, contextual variables, and individual student characteristics. A recurring theme across multiple investigations highlights the central role of teachers in effective gamification adoption: although secondary educators acknowledge its potential advantages, they frequently cite constraints such as limited time, insufficient training, scarce resources, and lack of institutional support as significant hurdles. The review also uncovers notable gaps in the literature, especially regarding the systematic study of optimal session length and intensity. The article closes by offering evidence-based suggestions for researchers, practitioners, and policymakers, advocating for design-based research approaches that encourage collaboration between researchers and teachers, robust teacher professional development, and the creation of integrated pedagogical and technological frameworks to support enduring gamification practices in secondary school contexts.

**Keywords:** game-based learning, gamification, learning outcomes, systematic review, student motivation, teacher attitudes

## INTRODUCTION

The incorporation of gamification into secondary education marks a notable development in pedagogy during the twenty-first century. This trend has unfolded alongside the progression of the first generation of digital natives through educational institutions and the rapid expansion of technology-enhanced learning accelerated by the COVID-19 pandemic. As highlighted by Faure-Carvallo et al. (2022) in their systematic review, digital gamification is now common among adolescents, driven by a marked rise in its usage, diversification of formats, widespread accessibility of Wi-Fi and smartphones, and a broad array of platforms and resources. This widespread technological presence, coupled with humans' inherent inclination toward play as a learning method, presents both opportunities and challenges for educators and researchers seeking to understand how gamification can be utilized effectively in secondary school settings.

The pedagogical relevance of gamification is grounded in longstanding educational theories. Faure-Carvallo et al. (2022) situate their study within the work of Piaget, Vygotsky, and Montessori, who emphasized the role of play in individual development and learning. These foundational ideas continue to influence contemporary student-centered approaches, which Collier (2022) describes as learning that is autonomous, self-directed, experiential, goal-oriented, and heuristic. Additionally, Clark (2023) argues that digital games inherently support quality learning by teaching players a range of skills through engaging play, even when the content is not explicitly academic. Together, perspectives from developmental psychology, progressive pedagogy, and game studies offer a substantial theoretical basis for examining gamification's potential educational benefits.

Despite the theoretical foundation and the growing body of literature on gamification in education, important gaps persist, particularly regarding its use in secondary schools. Vrcelj et al. (2023) point out that research tends to focus more on higher education, with less attention paid to primary and secondary levels. This disparity is noteworthy because secondary education coincides with significant cognitive and emotional growth, identity formation, the exploration of interests, and the development of learning attitudes among adolescents (Bharti, 2023). Motivation during this stage is especially important, underscoring the need for pedagogical strategies capable of maintaining engagement throughout these changes.

This paper seeks to synthesize recent peer-reviewed research on gamification in secondary education, drawing on five methodologically varied studies published between 2022 and 2023. These studies collectively explore the current understanding of gamification's effectiveness, the underlying mechanisms, the student populations that derive the most benefit, and various challenges encountered during implementation. By integrating findings from systematic reviews, experimental studies, mixed-methods research, and surveys of teacher perspectives, this article aims to furnish researchers, educators, and policymakers with an evidence-informed basis for advancing the application of gamification in secondary school contexts.

## Theoretical Frameworks Underpinning Gamification Research

The empirical studies examined in this review draw on multiple theoretical frameworks that help clarify how gamification affects learning processes and identify the contexts in which it tends to be most effective. A thorough grasp of these underlying theories is crucial for making sense of the research outcomes and for developing gamification strategies that work in practice.

### Self-Determination Theory

Self-Determination Theory (SDT), as formulated by Deci and Ryan (2024), serves as the primary theoretical framework within the surveyed literature. Bharti (2023) succinctly outlines the theory's application to gamification, identifying three fundamental psychological needs: autonomy, competence, and relatedness. In educational settings, autonomy pertains to students' desire to exert control over their own learning processes; competence relates to their motivation to achieve mastery over tasks; and relatedness concerns the need to feel connected with instructors and peers. Empirical studies have consistently supported the notion that fulfillment of these needs enhances intrinsic motivation, which in turn correlates with improved learning outcomes.

Gamification interventions aim to address these psychological needs through tailored design features. Autonomy is promoted when gamified environments allow learners to make choices, set personalized goals, and monitor their progress (Bharti, 2023). To foster competence, mechanisms such as points, leaderboards, and rewards provide feedback that engages both intrinsic and extrinsic motivational factors by clarifying levels of mastery. The aspect of relatedness is encouraged through collaborative game components. However, Faure-Carvalho et al. (2022) observe that this dimension remains insufficiently developed in current gamification practices. They highlight that while individualized game elements emphasize previous personal differences and contribute to the appeal of gamification, incorporating collaborative elements during adolescence could be particularly beneficial, given that group belonging plays a significant role in identity formation at this developmental stage.

### Expectancy-Value Theory

Another theoretical framework relevant to gamification research is Expectancy-Value Theory. Bharti (2023) characterizes this theory by its proposal that motivation depends on the anticipated success and the importance attributed to the task. This perspective helps clarify how gamification components might affect motivation via two separate routes: first, by modifying students' beliefs about their chances of success through mechanisms such as scaffolding, incremental challenges, and explicit feedback; second, by increasing the perceived relevance or appeal of learning activities through elements like storytelling, visual design, and social acknowledgment. According to the theory, gamification strategies that engage both expectancy and value aspects are more likely to elicit stronger motivational responses.

Expectancy-value theory offers a valuable framework for examining motivation; however, it has been criticized for emphasizing cognitive and rational processes, portraying motivation primarily as a deliberate evaluation of

potential success and rewards. This perspective tends to overlook the significant influence of emotions, identity, and unconscious factors that contribute to learner engagement. In addition, the theory inadequately addresses the dynamic effects of social and contextual elements, such as peer influence or classroom environment, which can sometimes supersede individual expectations. In a comparable manner, gamification often depends on surface-level extrinsic incentives like badges and points.

Critics suggest that this approach can diminish intrinsic motivation by shifting attention away from the intrinsic value of learning toward external rewards (Machkour, 2025), a phenomenon referred to as the over justification effect. Moreover, its impact varies considerably among learners; what stimulates one student may demotivate another, and the initial appeal frequently diminishes over time, resulting in reduced engagement. Without careful integration into pedagogical practice, gamification risks becoming a superficial addition of points layered over static, uninspired material, thereby failing to generate meaningful or lasting educational outcomes.

### **Foundational Theories of Play and Learning**

Contemporary research on gamification in education builds on a long-standing tradition of play-based learning theory. Faure-Carvalho et al. (2022) identify this intellectual heritage in the foundational contributions of Piaget, Vygotsky, and Montessori, all of whom emphasized the significance of play in individual development and learning. Piaget conceptualized play as a means of assimilation (Samandar & Azizbek, 2024), through which children practice skills and interpret their surroundings. Vygotsky highlighted the socio-cultural context of play (Daramola et al., 2024), proposing that it establishes a zone of proximal development that allows children to perform beyond their usual abilities. Montessori incorporated structured play (Randolph et al., 2023) within a framework of self-directed, sensory learning. This historical context serves not just as a background note but underscores that employing games in education is grounded in intrinsic human learning mechanisms rather than being solely a product of digital innovation.

While digital technologies have expanded the possibilities for gamified learning, they build upon rather than supplant these foundational theories. Modern gamification (manifested through mechanisms such as points, badges, and leaderboards) represents a technologically mediated effort to capture the motivational dynamics inherent to playful activity. Nonetheless, this technological extension presents certain challenges. Critics contend that digital gamification risks (Hing et al., 2022) reducing play to a system focused on extrinsic rewards, thereby diminishing the intrinsic enjoyment, creativity, and social interaction emphasized by Piaget, Vygotsky, and Montessori. The task for current educational design lies in employing digital tools not to substitute genuine play but to foster environments where the profound developmental advantages of play can be nurtured and expressed in innovative ways.

### **Technological Pedagogical Content Knowledge**

Effective implementation of gamification involves not only a grasp of motivational theories but also the integration of technological, pedagogical, and content knowledge. Bueno et al. (2023) applied the Technological Pedagogical Content Knowledge (TPACK) framework to examine gamification. Their findings indicate a generational disparity: younger teachers tend to possess greater familiarity with both the games themselves and their content, as well as the related pedagogical approaches, compared to older teachers. This suggests that successfully applying gamification depends on teachers' ability to combine knowledge from various domains, and that differences in preparation between generations could influence the quality of implementation.

TPACK has faced criticism for conceptualizing technology as a neutral, supplementary element instead of acknowledging its role as a transformative agent that significantly alters both content and teaching methods. The framework suggests that educators can incorporate technology into their current approaches without considering how digital tools might redefine disciplinary limits and generate novel ways of representing knowledge.

## **RESEARCH METHODOLOGY**

The five studies included in this synthesis utilize various methodological approaches, illustrating the development of gamification research alongside ongoing difficulties in examining complex educational interventions within real school settings.

The search strategy is incorporated Boolean operators combined with targeted keywords, including “gamification”, “game elements”, and “secondary education”. The scope is restricted to peer-reviewed articles published in English from 2015 to 2025. The databases selected for the search encompass ERIC, PsycINFO, Scopus, Web of Science, and IEEE Xplore. Additional efforts are involved manual examination of reference lists and focused searches of grey literature through ProQuest Dissertations. The population includes secondary school students; the intervention is empirical research applying gamification; the comparison involves either non-gamified or alternative approaches; outcomes cover engagement, motivation, and academic achievement; and study designs include empirical quantitative, qualitative, or mixed methods research. Studies excluded are non-empirical works, conference abstracts, and research centered exclusively on full digital games rather than gamification components. The study selection is performed independently by two reviewers who will screen titles, abstracts, and full texts. Any disagreements will be resolved through discussion or consultation with a third reviewer. The selection process will be documented using a PRISMA flow diagram (Rethlefsen & Page, 2022).

### **Systematic Literature Reviews**

Two of the five studies are systematic literature reviews that synthesize prior research by following recognized methodological protocols. Faure-Carvalho et al. (2022) adhered to the PRISMA guidelines, conducting their database searches in February 2022 using Scopus and the Web of Science Core Collection. Their search incorporated keywords such as gamification, game-based learning, and secondary, high, digital, video games, and videogames. This strategy initially identified 93 articles; after removing duplicates and screening for relevance and centrality to the topic, the final sample comprised 29 articles that met all inclusion criteria.

Vrcelj et al. (2023) based their review on the Systematic Literature Review guide by Okoli and Schabram (2010). Their search spanned publications from January 2018 to January 2022 within Web of Science and Scopus, using terms including gamification, learning, education, teaching, K-12, elementary, primary, and secondary, while excluding university. From an initial set of 291 articles. They applied inclusion criteria (focusing on studies published between 2018 and 2022, primary research in journals or conference proceedings, and English language) and conducted a quality assessment that yielded 20 articles for detailed examination. The inter-coder reliability between the two reviewers was reported as 0.88.

Both reviews utilized thematic analysis to extract common patterns among the selected studies. Faure-Carvalho et al. (2022) combined inductive and deductive approaches, establishing an initial coding framework while allowing themes to emerge iteratively through reflective analysis of shared elements across the articles.

### **Quasi-Experimental Design**

Leon et al. (2022) conducted a quasi-experimental study employing pretest-posttest measures to compare three groups: a control group receiving conventional instruction (n=143), an experimental group completing seven sessions of the intervention (n=45), and a second experimental group completing fifteen sessions (n=83). The total sample included 271 students (mean age = 14.42, SD = 0.72) drawn from four secondary schools in the Almeria province of Spain. Participants were selected through incidental non-probability sampling based on the voluntary participation of schools and teachers.

The intervention, titled The Legends of Eldor, involved a medieval fantasy storyline wherein each student developed a character by choosing a race (human, elf, or dwarf) and a class (warrior, wizard, or rogue). Students then organized into clans of five to collaborate as a team. Assessment relied on the PROLEC-SE battery, which measures lexical, syntactic, and semantic processing and screens for reading difficulties in individuals aged 12 to 18.

### **Mixed-Methods Empirical Investigation**

Bharti (2023) utilized a mixed-methods approach involving 100 senior secondary students from multiple schools in Ghaziabad, India. The schools were purposefully chosen to capture variability in socioeconomic status, curricula, and degrees of gamification application. Data was gathered through a structured survey employing Likert scale items, semi-structured interviews conducted with a subset of students, and classroom observations aimed at examining the practical execution of gamification strategies.

## Teacher Attitudes Survey

Vrcelj et al. (2023a) conducted a survey targeting teachers at the Civil Engineering Technical School in Rijeka, Croatia, where prior studies had indicated generally positive student reactions to gamification. The survey, carried out in February 2023, involved 28 teachers, representing an 85% response rate from a total of 33 invited participants. The questionnaire consisted of 33 items organized into five categories: teacher demographics, familiarity with gamification, actual implementation of gamification, attitudes toward its use, and open-ended feedback. The questions were primarily adapted from the work of Plantak Vukovac, Skara and Hajdin (2018), supplemented with elements derived from more recent literature.

## Empirical Findings: The Impact of Gamification on Students

### Effects on Student Motivation

Across the studies examined, the most consistently reported impact of gamification pertains to its positive effect on student motivation. Bharti (2023) notes that many students experienced heightened motivation when engaged in gamified learning contexts, attributing this to the provision of a perceived control over their learning, which in turn enhanced their sense of autonomy. Moreover, a notable proportion of students demonstrated a shift towards intrinsic motivation, characterized by increased interest and enjoyment during the learning process when elements of gamification were incorporated.

These observations are supported by the systematic review conducted by Faure-Carvalho et al. (2022), which synthesizes findings from multiple studies. For example, Yang's (2012) research involving 44 Taiwanese students indicates gamification's positive influence on learning motivation. Similarly, Imran et al. (2024) report that video game engagement among Pakistani adolescents appears to enhance their willingness to exert effort and embrace challenges. Miralles-Martinez's (2019) study in Chile highlights how involvement with video games fosters the development of skills that, while essential within virtual environments, are also pertinent to real-world contexts.

Additional corroboration arises from a teacher attitude survey by Vrcelj et al. (2023a), which reveals that 57% of teachers agree that gamification increases student interest in the subject matter, and 61% acknowledge its substantial role in boosting learner motivation. Furthermore, an overwhelming majority endorse the use of gamification as a tool to enhance student engagement (86%) and to make the subject more appealing and engaging to students (82%).

### Effects on Learning Outcomes

The relationship between gamification and learning outcomes is notably more intricate than its association with motivation, with findings indicating that positive effects depend significantly on factors such as implementation quality and individual student characteristics. Bharti (2023) identified a significant correlation between gamification and academic performance, observing that students engaged in gamified learning environments tended to outperform their peers in traditional settings on assessments and examinations. Qualitative insights further suggested that the immersive and memorable aspects of gamification contributed to enhanced content retention among students.

The systematic review conducted by Hoic-Bozic, and Dlab (2023) included nine studies focused on the influence of motivation and satisfaction on learning success, alongside three studies examining the impact of gamification on achieving learning outcomes. For example, Martínez-Hita et al. (2021) reported improved learning outcomes among 44 Spanish primary students, while Otero-Agra et al. (2019) observed enhanced practical skills in first aid among 489 Spanish secondary students.

Nonetheless, the systematic review also incorporated six studies presenting mixed or limited positive findings (Vrcelj et al., 2023). Jagus et al. (2018) found that although gamification increased achievement in mathematics for many students, the competitive elements led to demotivation and poorer performance for some individuals. Chapman and Rich (2018) reported increased motivation but noted that the effectiveness of gamification was

partial due to issues with focus and inconsistent learning gains relative to hybrid instruction without gamified elements. Likewise, Alshammari (2020) documented gamification's positive effects on learning success, motivation, and satisfaction but found no corresponding improvements in students' confidence or attention.

### Effects on Reading Processes

The quasi-experimental study conducted by Manzano-Leon et al. (2022) offers a comprehensive analysis of the impact of gamification on specific academic skills, with a particular emphasis on reading processes. The multivariate analysis of variance (MANOVA) assessing posttest-pretest differences across groups yielded significant results:  $F(20,494) = 11.531$ ,  $p < .001$ , partial eta squared ( $\eta^2p$ ) = .318. These findings indicate statistically significant differences across all variables examined among the three groups, accompanied by substantial effect sizes in most cases. Notably, the group that underwent 15 sessions exhibited greater improvements than the one with 7 sessions, suggesting a potential dose-response relationship.

Among immigrant students with diverse native languages, the intervention also produced statistically significant differences between groups. The MANOVA results for this subset showed  $F(10,24) = 3.117$ ,  $p < .011$ ,  $\eta^2p = .565$ , with large effect sizes observed specifically in measures of structure, comprehension, matching, pseudowords, and word speed. In the case of students diagnosed with dyslexia, results revealed  $F(20,112) = 10.056$ ,  $p < .001$ ,  $\eta^2p = .642$ , indicating significant differences in nearly all variables except for word speed and pseudoword speed. Subsequent post hoc analyses confirmed that the differences consistently emerged between the control group and the 15-session experimental group.

Importantly, the program's effects did not differ by gender. The multivariate analysis of covariance (MANCOVA) found  $F(10,109) = 1.149$ , Wilks' Lambda = .905,  $p = .333$ ,  $\eta^2p = .095$ , suggesting no significant gender-related differences in the outcomes following the intervention.

### Cognitive and Skill-Based Benefits

Beyond its effects on motivation and academic achievement, the reviewed literature highlights various cognitive and skill-related advantages linked to gamification. Faure-Carvallo et al. (2022) summarize evidence indicating that gamification can enhance problem-solving abilities, promote effective learning strategies, foster quick decision-making, and support collaborative knowledge construction. Additionally, it appears to contribute to perseverance, willingness to face challenges, social communication competencies, the acquisition of skills relevant to virtual environments, critical and reflective thinking, identity formation, and creativity.

When focusing on specific subject areas, gamification has been associated with improvements in task-related skills, literacy, vocabulary acquisition—both incidental and intentional—political education, comprehension of ethical concepts, and environmental consciousness (Faure-Carvallo et al., 2022). For example, Seidel et al. (2019) explored the use of digital strategy games with eight German students, illustrating their potential to facilitate political education within geography curricula. Similarly, Fjællingsdal and Klockner (2019) investigated a simulated digital ecosystem among 59 Norwegian students, suggesting that such tools can effectively enhance certain dimensions of environmental awareness.

### The Critical Role of Teachers

#### Teacher Attitudes and Perceptions

The teacher attitude survey conducted by Vrcelj et al. (2023a) offers valuable insights into the views of educators who bear primary responsibility for applying gamification in educational settings. The findings indicate that most participants possessed only moderate familiarity with gamification concepts. Specifically, merely about one-third demonstrated knowledge of game design components such as points, leaderboards, and badges. Nevertheless, despite this limited understanding, teachers acknowledged the potential advantages of gamification within classroom contexts. They observed that gamification could enhance students' interest in particular subjects and encourage more active participation in learning activities.

Furthermore, educators expressed considerable enthusiasm toward incorporating gamification, with a substantial proportion agreeing or strongly agreeing to several intended outcomes: improving teaching quality (69%), increasing student engagement (86%), making subject matter more appealing and engaging (82%), enhancing teaching effectiveness (78%), and modernizing instructional approaches (82%). These results imply that any existing reluctance to adopt gamification does not arise from fundamental disagreement with its objectives but rather from practical challenges related to its implementation.

### **Barriers to Implementation**

The survey revealed that the main obstacles to the adoption or adequate use of gamification were primarily related to practical constraints: 36% of respondents indicated insufficient time to design and implement such activities, while 18% reported a lack of knowledge regarding their creation. A minority (11%) expressed skepticism about the benefits of gamified activities for students, and only one teacher characterized the use of gamification as a form of trivial teaching. Importantly, no participants identified insufficient supervisory support as a hindrance, and merely 15% viewed gamification as a transient trend.

These results correspond with findings reported in systematic reviews. For instance, Faure-Carvalho et al. (2022) highlighted barriers such as methodological and epistemological differences across disciplines, teacher alienation related to the use of digital game-based environments (DGSE), and disparities in digital competence attributed to generational differences among educators. Similarly, Stieler-Hunt and Jones (2017) cited within the review, noted that educators employing immersive digital games might experience varying levels of alienation from their peers, with factors such as colleague resentment and concerns about curriculum integration and classroom management contributing to this sense of isolation, despite the instructors' conviction in the pedagogical value of these tools.

### **Facilitators of Implementation**

When teachers were asked about factors that might promote increased use of gamification, they cited several key elements: increased free time (78%), greater availability of digital tools and platforms (68%), sufficient computer equipment (68%), participation in training or workshops (57%), and access to expert mentorship (72%) (Vrcelj et al., 2023a). These results indicate that effective gamification implementation necessitates a multifaceted approach, addressing temporal resources, such as time for design and preparation; material resources, including equipment and digital tools; and human resources, exemplified by training and mentoring support.

### **Teacher Development Needs**

The evidence from various studies highlights the importance of comprehensive professional development programs for teachers. Vrcelj et al. (2023a) suggest organizing specialized training sessions on gamification to introduce educators to its underlying concepts and the principles of game design. These sessions might take the form of workshops or online courses and should ideally be facilitated by experts in the field or by practitioners who have effectively integrated gamification into their teaching practice. Additionally, they underscore the benefit of fostering peer collaboration by encouraging teachers to exchange their experiences with gamification, including sharing success stories and illustrative case studies. Such exchanges could occur through teacher forums, social media platforms, or within the framework of the school's professional learning communities.

### **Game Design Elements and Digital Tools**

#### **Common Game Design Elements**

Vrcelj et al. (2023) conducted a systematic review to examine the variety of game design elements utilized within gamification interventions. Many of the studies (eight) incorporated two game design elements, while four applied three, and a smaller number employed more than three elements. Among these, the most complex intervention (ID1) integrated multiple components including stories, avatars, challenges, points, leaderboards,

badges, awards, and progress bars. Notably, points and leaderboards frequently appeared together across several interventions (ID4, ID8, ID9, ID13, ID14, ID15).

The authors observe that this combination aligns with the Points, Badges, and Leaderboards (PBL) framework commonly referenced in prior research. They stress, however, that effective gamification generally requires the integration of at least two game design elements to enhance the activity. In this context, points are described as the most straightforward form of reward and serve as a prevalent feedback mechanism across various games. Leaderboards function to stimulate motivation by fostering competition among participants. Badges act as virtual tokens of accomplishment, representing success, level completion, or goal attainment. From the educator's perspective, badges provide tangible evidence of achievement, while from the learner's standpoint, they deliver positive reinforcement (Vrcelj et al., 2023a).

### **Digital Tools and Platforms**

The study identifies various digital tools employed to implement gamification. Some researchers developed custom applications, such as Math Widget, Ocean Literacy, and Reading Battle, while others utilized widely accessible platforms including ClassDojo, Moodle, Kahoot, Edmodo, Level Up, Peer Wise, Los Cokitos, and Quizizz (Vrcelj et al., 2023). According to a survey of teachers, Kahoot emerged as the most frequently used tool, and Loomen (a localized version of the Moodle learning management system (LMS) adopted in Croatian schools) was the most popular platform (Vrcelj et al., 2023a).

The authors highlight that digital tools or e-learning platforms not specifically designed for gamification but capable of integrating game design elements can serve effectively in this capacity. This implies that, rather than investing in the development of complex and costly educational games, educators can achieve gamification objectives by leveraging simpler, often freely available digital resources. Such an approach holds relevance for educational institutions operating under constraints in technological infrastructure.

### **Research Gaps and Future Directions**

#### **Methodological Limitations**

The systematic reviews reveal notable limitations within the current research landscape. Faure-Carvalho et al. (2022) highlight a dominant representation of Western contexts in their sample, with a concentration of studies primarily situated in Europe, the United States, and developed Asian countries, indicating limited diversity. Vrcelj et al. (2023) concede that their search was restricted to certain bibliographic databases and suggest that employing alternative or additional keywords could potentially yield a broader range of relevant articles. Furthermore, the teacher attitude study, which involved 28 participants from a single institution, is noted to have a relatively small sample size for quantitative analysis, thereby constraining the extent to which the findings can be generalized (Vrcelj et al., 2023a).

#### **Substantive Gaps**

Both systematic reviews highlight a notable deficit of rigorous empirical research conducted in primary and secondary educational settings, despite a relatively extensive body of work focusing on higher education. Vrcelj et al. (2023) emphasize that among studies related to school contexts, only 20 explicitly detailed the research methods and findings. They point out the difficulty in locating studies involving primary and secondary students that provide empirical evidence, as many publications tend to offer descriptive accounts of gamification use without rigorous evaluation. This observation aligns with earlier concerns expressed by Dichev and Dicheva (2017), who argued that the existing research on gamification's effectiveness in educational environments remains inadequate and insufficiently substantiated by empirical data.

Furthermore, Vrcelj et al. highlight a gap regarding systematic investigations into gamification implementation in schools during the COVID-19 pandemic, attributing this to the limited timeframe available for disseminating findings on rapidly evolving educational practices. The long-term impact of gamification strategies has also received limited attention; for instance, Manzano-Leon et al. (2022) note that their program was implemented

over the course of an academic year, which constrains the ability to assess the sustained effects of these play-based approaches on reading development.

### **Future Research Directions**

Recommendations drawn from multiple studies highlight several key areas for future research. Vrcelj et al. (2023) advocate for longitudinal studies that monitor the effects of gamification over an extended timeframe, which may provide valuable insights into the durability of its impact. They also emphasize the need for comparative investigations to evaluate the relative effectiveness of various gamification strategies and how these approaches affect different subjects or student populations.

From a methodological perspective, Vrcelj et al. recommend the use of Design Based Research (DBR). This approach prioritizes collaboration between researchers and educators through iterative cycles of analysis, design, development, and implementation. A notable advantage of DBR lies in its application within authentic educational settings rather than isolated laboratory conditions, a factor that gains importance when working with younger learners, such as those in primary and secondary education. Within this framework, teachers assume a pivotal role, and data collection should integrate qualitative methods (including interviews with teachers and students, classroom observation, and examination of student work) with quantitative measures like surveys, knowledge assessments, and analysis of digital tool event logs.

Bharti (2023) highlights ethical considerations that have emerged alongside the increasing adoption of gamification in educational contexts. These include concerns related to student data privacy, ensuring fairness in competitive elements, and the risk of students developing an excessive dependence on gamified features. Addressing these ethical issues through systematic research will be essential as gamification continues to gain prominence in education.

Gamification's effectiveness largely depends on teachers, who encounter difficulties such as limited training, constrained time, and managing the balance between game elements and curricular objectives. The pedagogical expertise of teachers is crucial for integrating gamification in a meaningful way rather than relying on superficial reward mechanisms. Future research would benefit from longitudinal studies that explore sustained student engagement and frameworks centered on teacher implementation. Moreover, schools should allocate resources toward professional development programs designed to equip teachers with strategies that align gamification with instructional goals. Principals should encourage collaboration among teachers and involving them in the co-design process to promote sustainable and contextually appropriate use.

## **DISCUSSION AND IMPLICATIONS**

### **Interpreting the Evidence Base**

The aggregated findings from these five studies suggest that gamification has the potential to serve as an effective instructional strategy in secondary education, particularly by fostering student motivation and engagement. The quasi-experimental data reported by Manzano-Leon et al. (2022) indicate that carefully designed gamification interventions may lead to significant enhancements in certain academic skills, with effect sizes that hold practical relevance for educational outcomes. Systematic reviews corroborate that these results align with a broader international body of research, although the predominance of studies conducted in Western and industrialized Asian settings constrains the extent to which these conclusions can be generalized globally.

Nevertheless, several studies, including those by Vrcelj et al. (2023), document only partial positive effects, underscoring that gamification's benefits are not uniformly experienced. Evidence that competition may reduce motivation for some students (Jagus et al., 2018), that increases in motivation do not always translate into improved performance (Lam et al., 2017), and that factors such as confidence and attention remain unchanged in certain cases (Alshammari, 2020) highlight the complexity of gamification's impact. These findings imply that variables such as individual student differences, the fidelity of implementation, and the educational context play crucial roles in moderating outcomes.

## The Implementation Challenge

The primary practical implication derived from this synthesis is that the effective implementation of gamification largely hinges on the role of teachers. The teacher attitude survey conducted by Vrcelj et al. (2023a) indicates that although educators acknowledge the potential benefits of gamification and show interest in adopting it, they confront considerable challenges such as limited time, insufficient training, inadequate resources, and a lack of institutional support. These observations correspond with those reported by Plantak Vukovac et al. (2018), where teachers highlighted deficiencies in knowledge related to gamification, time constraints, and limited motivation to enhance teaching methods.

Overcoming these obstacles necessitates a coordinated systemic response, as individual educators are unlikely to resolve issues related to time limitations, resource availability, or professional development independently. It is imperative for schools and educational authorities to recognize that successful gamification integration involves dedicated investment in staff training, technological infrastructure, and sustained support mechanisms. Notably, the mentorship approach favored by teachers in the Vrcelj et al. (2023a) survey (where 72% identified the value of expert mentorship) indicates that peer support and expert guidance may play a role equally significant to formal training programs.

## Design Considerations

This study also offers insights into the development of gamification interventions. The predominance of points and leaderboards, as identified by Vrcelj et al. (2023), likely reflects their straightforward implementation; however, it may also imply that other gamification components with potential benefits remain underexploited. Elements such as stories, avatars, and badges appeared infrequently in the analyzed studies, although Faure-Carvalho et al. (2022) contend that narrative engagement and social presence play a crucial role in adolescents' identity formation. Moreover, the focus on individual competition prevalent in many gamified designs might overlook the significance of collaborative learning and peer interaction in developmental processes.

The dosage effect reported by Manzano-Leon et al. (2022) (where interventions with 15 sessions yielded greater improvements than those with 7) indicates that achieving substantial outcomes may depend on the intervention's duration. Short-term, single-session gamification activities might elicit temporary increases in motivation but are unlikely to foster enduring learning gains.

## Equity Considerations

The finding that gamification can be particularly beneficial for at-risk populations—immigrant students and students with dyslexia—has important equity implications. If gamification can help address achievement gaps for students facing additional learning challenges, then ensuring equitable access to well-designed gamification interventions becomes a matter of educational justice. However, this potential can only be realized if gamification is implemented in ways that are inclusive and supportive rather than competitive and potentially demotivating for struggling students.

## CONCLUSION

This synthesis of five peer-reviewed studies published between 2022 and 2023 provides a comprehensive picture of the current state of knowledge regarding gamification in secondary education. The evidence consistently supports gamification's positive impact on student motivation and engagement, with promising findings regarding its effects on learning outcomes, particularly for reading processes and for at-risk populations including immigrant students and students with dyslexia. Effect sizes range from moderate to large across studies, though partial positive results indicate that effectiveness depends on implementation quality, contextual factors, and individual student differences.

A critical finding across multiple studies is the identification of teachers as the pivotal factor in successful gamification implementation. While secondary teachers recognize gamification's potential benefits and express motivation to use it, they consistently report insufficient time, inadequate training, limited resources, and lack

of institutional support as barriers to effective adoption. Addressing these barriers requires systemic investment in professional development, technology infrastructure, and ongoing support systems, including peer mentorship and expert guidance.

The research base, while growing, remains limited in several respects. Longitudinal studies examining sustained effects over time are scarce. Representation of non-Western educational contexts is limited. The optimal duration and intensity of gamification interventions remain underspecified. Ethical considerations regarding data privacy, competition, and potential overreliance on gamification elements require systematic investigation.

Future research should employ Design Based Research methodologies that foster sustained collaboration between researchers and teachers, enabling iterative refinement of gamification interventions in authentic educational contexts. Such research should examine not only whether gamification works, but for whom, under what conditions, and through what mechanisms. It should investigate how gamification can be designed to support collaborative learning and social development, not only individual achievement and competition. And it should explore how gamification can be implemented equitably, ensuring that its benefits reach the students who need them most.

As Faure-Carvalho et al. (2022) observe, including digital games in SE requires the complicity of all the teaching staff and a broad understanding on the part of the families of these students. Gamification is not a technological solution that can be simply added to existing educational practices. It is a pedagogical approach that requires thoughtful design, skilled implementation, and sustained support. When these conditions are met, the evidence suggests that gamification can indeed fulfill its promise of making learning more engaging, motivating, and effective for secondary students.

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