Gamified Assessment in Higher Education: A Conceptual Framework for Students' Motivation and Engagement

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The European Conference on Education 2024
Official Conference Proceedings

Abstract
Gamification of assessment has recently emerged as a valuable strategy to enhance student motivation and engagement in higher education. However, studies have focused on behavioural reactions and learning outcomes in response to gamification, the effective design of gamified assessment to improve students' motivation and engagement remains unclear, creating a notable gap in the current literature. The purpose of this research is to fill this identified research gap, proposing a conceptual framework addressing the design elements of gamified assessment in higher education. The provisional conceptual framework, Gamified Assessment for students' Motivation and Engagement, which is abbreviated as GAME, aims to enable educators in higher education to design positive gamified assessment experiences for students. A systematic literature review has been conducted as the research methodology, with PRISMA systematic procedures used to screen the articles across JSTOR, SCOPUS, ProQuest, and Web of Science databases. Through this procedure, 69 relevant studies have been identified. Eight attributes in relation to assessment design were summarised. The conceptual framework on the assessment methodology was constructed. The framework, GAME, provides valuable insights for creating motivating and engaging assessment in higher education. It emphasises the design elements of gamified assessment and has the potential for improving other aspects of student experience such as student satisfaction and academic performance. The framework can also be used as a tool for future empirical and experimental research.

Keywords: Higher Education, Gamification, Assessment Methodology, Student Motivation, Student Engagement

Introduction

In recent years, gamification has gained significant traction as an innovative approach to enhance student motivation and engagement within higher education (Deterding et al., 2011; Hamari et al., 2014; Kapp, 2012; Ryan & Deci, 2000; Barata et al., 2013; Domínguez et al., 2013; Seaborn & Fels, 2015; Anderson & Dill, 2000; de-Marcos et al., 2014; Chapman & Rich, 2018). By integrating game mechanics into educational contexts, educators aim to create more interactive and enjoyable learning experiences that resonate with students' intrinsic and extrinsic motivations (Ryan & Deci, 2000; Kapp, 2012; Hamari et al., 2014; Deterding et al., 2011; Nah et al., 2014; Huang & Soman, 2013; Nicholson, 2012). Despite the growing interest in this area, the application of gamification in assessment, particularly its design to foster motivation and engagement, has not been sufficiently explored (Seaborn & Fels, 2015; Barata et al., 2013; Domínguez et al., 2013; Anderson & Dill, 2000; De Freitas & Griffiths, 2008). This paper seeks to address this gap by proposing the Gamified Assessment for students' Motivation and Engagement (GAME) framework, which provides a structured approach for designing gamified assessments that effectively engage and motivate students.

Recent studies emphasize the critical role of gamification in enhancing motivation, engagement, and academic performance in higher education. For instance, a longitudinal study by Lampropoulos and Sidiropoulos (2024) demonstrated that gamification significantly improves academic outcomes, including success and retention rates, compared to traditional and online learning methods. Similarly, Alenezi (2023) found that gamification not only boosts engagement but also fulfills students' psychological needs for autonomy, competence, and relatedness, aligning with self-determination theory. Additionally, Sánchez-Martín et al. (2023) highlighted the effectiveness of gamification in making challenging subjects, like physics, more engaging through game elements like challenges and leaderboards. Collectively, these studies reinforce the notion that well-designed gamification strategies can significantly enhance both student motivation and educational outcomes across various learning contexts.

The significance of this study lies in its potential to transform traditional assessment practices by incorporating elements that are proven to stimulate student interest and participation (Hamari et al., 2014; Kapp, 2012; Deterding et al., 2011; Anderson & Dill, 2000; Ryan & Deci, 2000; Barata et al., 2013; Domínguez et al., 2013; Seaborn & Fels, 2015; Chapman & Rich, 2018). Through a systematic review of the existing literature, this paper identifies the key attributes of successful gamified assessments and integrates them into a comprehensive framework that can be applied across various educational contexts (Deterding et al., 2011; Hamari et al., 2014; Kapp, 2012; de-Marcos et al., 2014).

Methodology

A systematic literature review was conducted to identify the key attributes of gamified assessments that contribute to student motivation and engagement (Higgins & Green, 2011; Moher et al., 2009; Hamari et al., 2014; Kapp, 2012; Deterding et al., 2011; Anderson & Dill, 2000; Barata et al., 2013; PRISMA Group, 2009). The review adhered to the PRISMA guidelines, which provide a standardized approach to literature selection and evaluation (PRISMA Group, 2009; Moher et al., 2009; Higgins & Green, 2011; Nicholson, 2012). Articles were identified through comprehensive searches in JSTOR, SCOPUS, ProQuest, and Web of Science databases, focusing on journal articles, books, and conference papers that

address gamification, assessment, and student engagement in higher education (Hamari et al., 2014; Kapp, 2012; Deterding et al., 2011; Huang & Soman, 2013).

The search yielded 8,397 potential sources, which were then subjected to a rigorous screening process (Higgins & Green, 2011; Moher et al., 2009; PRISMA Group, 2024; Hamari et al., 2014; Chapman & Rich, 2018). Duplicates were removed, and the remaining 2,397 articles were further screened based on relevance to the research question (Deterding et al., 2011; Anderson & Dill, 2000; Barata et al., 2013; Kapp, 2012; De Freitas & Griffiths, 2008). Abstracts were reviewed, leading to the exclusion of 2,062 articles that did not meet the inclusion criteria (Hamari et al., 2014; PRISMA Group, 2024; Moher et al., 2009; Nah et al., 2014). Full-text reviews were conducted on 75 articles, with 69 studies ultimately being included in the analysis.

The selected studies were analyzed to identify recurring themes and attributes related to the design of gamified assessments (Deterding et al., 2011; Hamari et al., 2014; Anderson & Dill, 2000; Barata et al., 2013; Seaborn & Fels, 2015; Huang & Soman, 2013; Nah et al., 2014). These attributes were then synthesized into the proposed GAME framework, which is structured around four key aspects: Control, Context, Components, and Connectivity (Kapp, 2012; Ryan & Deci, 2000; Domínguez et al., 2013; Seaborn & Fels, 2015; Chapman & Rich, 2018). The potentially relevant literature has been identified, screened and checked for eligibility as show in the flowchart below (Figure 1).

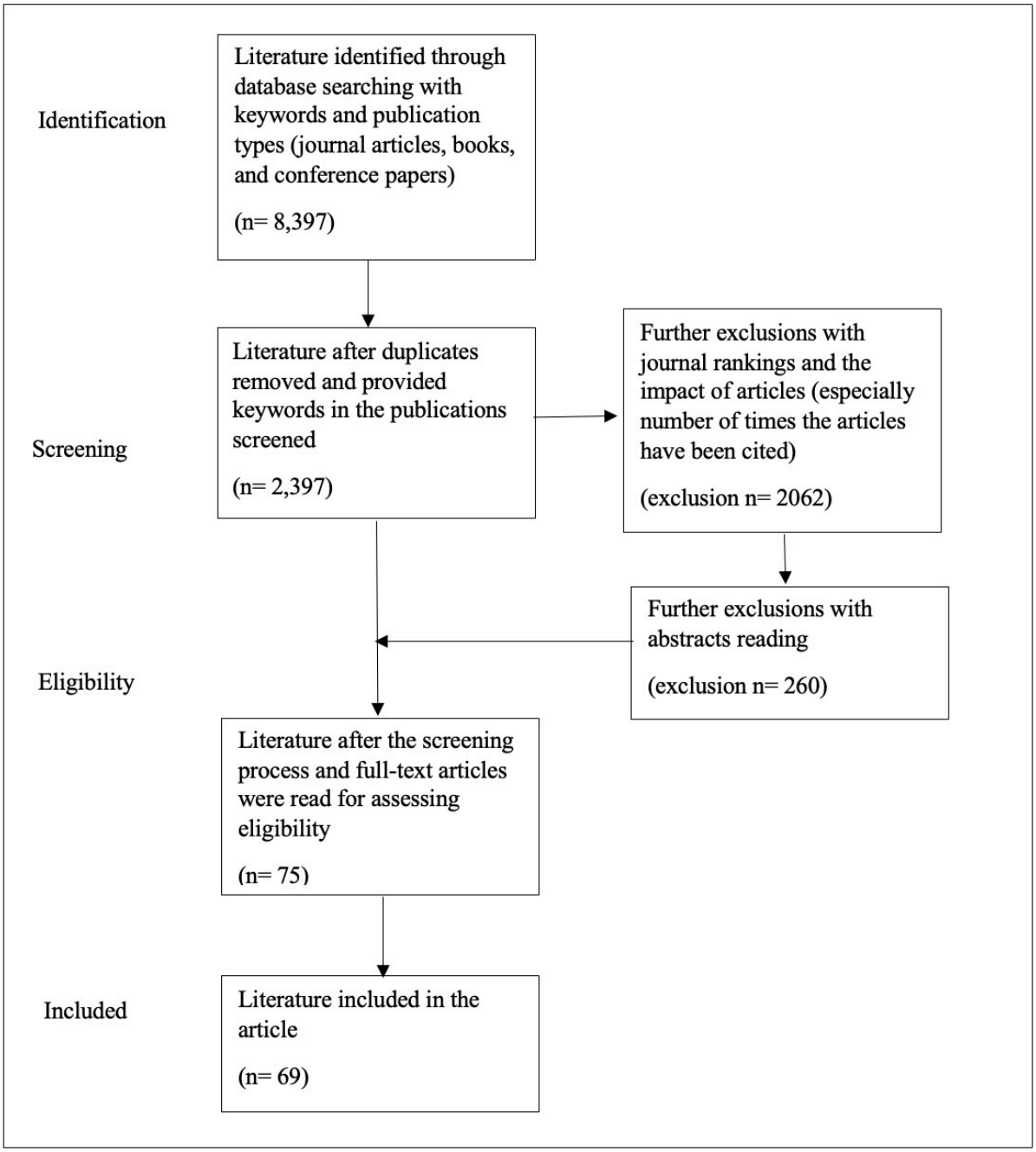

Figure 1 PRISMA Flow Chart Based on PRISMA Group (2024)

Proposed GAME Framework

The systematic review revealed eight key attributes (Table 1) that are critical to the design of gamified assessments aimed at enhancing student motivation and engagement. These attributes are organized into four overarching aspects within the GAME framework (Figure 2): Control, Context, Components, and Connectivity.

Attributes	**Relevant Research**	**Main Arguments & Critical Reflections on Professional Practices**
Gaming Objectives	e.g. Werbach & Hunter (2012), Deterding et al. (2011), Landers (2014), Suh, Wagner, & Liu (2015), Bai et al. (2020)	The inclusion of SMART objectives ensures clarity but needs to be balanced with flexibility to cater to diverse learning styles. Recent studies (Suh, Wagner, & Liu, 2015; Bai et al., 2020) highlight the need for goal setting that also allows for adaptive pathways based on learner progress.
Gaming Rules	e.g. Koivisto & Hamari (2019), Nicholson (2015), Sailer et al. (2017), Lameras et al. (2022)	Clear rules are crucial for fairness, but overemphasis on structure can stifle creativity and engagement. Sailer et al. (2017) and Lameras et al. (2022) stress the importance of balancing rule structure with creative freedom to maintain engagement.
Adaptability	e.g. Bodnar et al. (2016), Seaborn & Fels (2015), Holstein, McLaren, & Aleven (2021), Huang (2022)	Adaptability is key for personalizing learning, ensuring that gamification meets diverse learner needs, though it requires careful implementation to avoid inconsistencies. Research by Holstein et al. (2021) and Huang (2022) further supports the role of adaptability in enhancing learning outcomes.
Associations	e.g. Kapp (2012), Sweller, Ayres, & Kalyuga (2011), Plass, Homer, & Kinzer (2020), Koivisto & Hamari (2019)	Strong associations between game elements and educational content are vital for relevance; misalignment can reduce educational value. New studies underline the importance of these connections for effective learning transfer (Plass et al., 2020; Koivisto & Hamari, 2019).
Measures	e.g. Hattie & Timperley (2007) Nicol & Macfarlane-Dick (2006), Sailer et al. (2017), Bai et al. (2020)	Transparent measures linked to learning objectives enhance fairness, but a balance between quantitative and qualitative assessments is necessary. Recent findings highlight the need for both types of assessments to capture a complete picture of learner progress (Sailer et al., 2017; Bai et al., 2020).
Multimedia	e.g. Mayer (2009), Fiorella & Mayer (2015), Clark & Mayer (2016), Tsai (2021)	Using multimedia caters to different learning styles and enhances engagement, but it must be integrated thoughtfully to avoid cognitive overload. Recent research emphasizes the importance of careful multimedia design to enhance learning without overwhelming students (Clark & Mayer, 2016; Tsai, 2021).
Evaluation & Feedback	e.g. Ryan & Deci (2000), Koivisto & Hamari (2019), Nicol & Macfarlane-Dick (2006), Hattie & Timperley (2007)	Continuous, formative feedback is essential for motivation and self-regulation; however, the timing and specificity of feedback are critical. Research supports the importance of immediate and specific feedback for sustaining engagement and learning (Nicol & Macfarlane-Dick, 2006; Hattie & Timperley, 2007).
Engagement & Interactions	e.g. Plass, Homer, & Kinzer (2020) Lameras et al. (2022), Suh, Wagner, & Liu (2015); Holstein et al. (2021)	Engagement is sustained through meaningful interactions, but professional practices must ensure these interactions are well-facilitated and aligned with learning goals. Suh et al. (2015) and Holstein et al. (2021) stress the importance of interaction quality in maintaining learner motivation.

Table 1: Critical Attributes Contributing to Gamified Assessment Design for Enhancing Student Motivation and Engagement

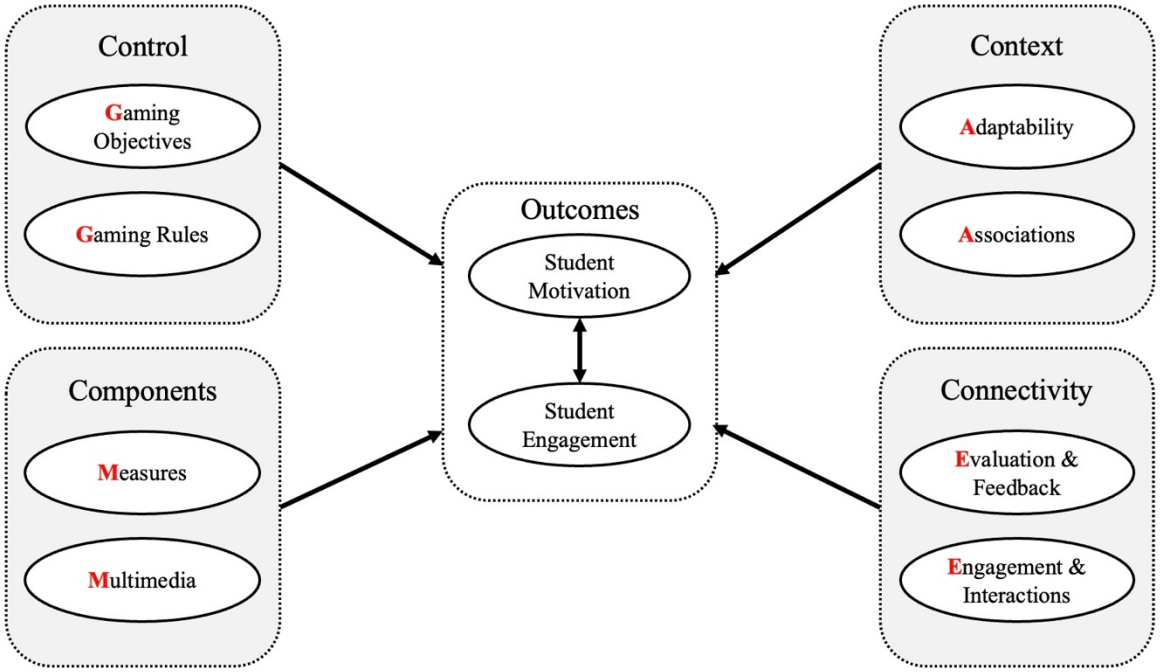

Figure 2: Proposed Game Framework by the Authors of This Article

Control (The Two Gs in GAME)

Gaming Objectives (SMART): The integration of SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) objectives within gamified assessments is critical for providing clear direction and measurable outcomes (Ryan & Deci, 2000; Kapp, 2012; Hamari et al., 2014; Deterding et al., 2011; Huang & Soman, 2013). These objectives ensure that students understand what is expected, which fosters a focused learning environment where students can achieve set goals efficiently. Recent studies have further substantiated the effectiveness of SMART goals in enhancing student motivation by making tasks appear more attainable and providing a clear pathway to success (Alenezi, 2023; Lampropoulos & Sidiropoulos, 2024). However, while SMART objectives can enhance clarity and focus, they may also limit creativity and engagement for students who prefer exploratory or less structured environments (Nicholson, 2012; Sánchez-Martín et al., 2023). To address this potential limitation, it is essential to balance the rigidity of SMART objectives with flexible opportunities that allow students to explore various pathways to achieve success, thereby catering to diverse learning preferences (Chapman & Rich, 2018; Yildirim & Demir, 2024).

Gaming Rules: Establishing clear and structured rules is another vital aspect of the Control component in gamified assessments (Domínguez et al., 2013; Seaborn & Fels, 2015; Barata et al., 2013). Rules provide a framework that ensures fairness and consistency, which is crucial in maintaining the integrity of the assessment and fostering a competitive yet collaborative learning environment (Kapp, 2012; Huang & Soman, 2013). However, recent research highlights that an overemphasis on rules can create a restrictive environment, potentially stifling creativity and reducing student engagement (Nicholson, 2012; Van Roy & Zaman, 2023). Therefore, it is critical to design rules that offer enough structure to guide student behavior while still allowing for flexibility and creative problem-solving, which can lead to more meaningful and engaging learning experiences (Ryan & Deci, 2000; Hamari et al., 2014).

Context (The Two As in GAME)

Adaptability: The adaptability of gamified assessments is crucial for personalizing the learning experience to meet diverse student needs and preferences (Kapp, 2012; Hamari et al., 2014; Deterding et al., 2011). Customization allows educators to tailor activities to align with individual learning styles, thereby increasing student engagement and motivation (Seaborn & Fels, 2015; Huang & Soman, 2013). Recent studies support the view that adaptability in gamified environments leads to more personalized and effective learning experiences, particularly in diverse classroom settings (Alenezi, 2023; Lampropoulos & Sidiropoulos, 2024). However, the downside of high customization is the potential for resource-intensive implementations, which can be challenging for educators to manage and sustain over time (Chapman & Rich, 2018). Additionally, excessive personalization may introduce inconsistencies in assessment outcomes if not carefully balanced with standardized criteria (Barata et al., 2013; de-Marcos et al., 2014).

Associations: Strong associations between gamified elements and course content are essential for ensuring that the game mechanics are directly relevant to the learning objectives (Seaborn & Fels, 2015; Barata et al., 2013; Domínguez et al., 2013). This alignment reinforces the educational value of the assessment and facilitates the transfer of skills and knowledge to real-world applications (Kapp, 2012; Hamari et al., 2014). Recent research emphasizes the importance of this connection, showing that well-integrated gamification can significantly enhance learning outcomes by making content more relatable and engaging (Sánchez-Martín et al., 2023; Van Roy & Zaman, 2023). Conversely, weak or poorly defined associations can lead to perceptions of irrelevance, where students may view the gamified components as disconnected from the actual course material, thereby reducing the overall effectiveness of the assessment (Chapman & Rich, 2018; Ryan & Deci, 2000).

Components (Two Ms in GAME)

Measures: Transparent and well-aligned criteria for evaluating student performance are critical in gamified assessments (Hamari et al., 2014; Kapp, 2012; Deterding et al., 2011). These measures should be directly linked to learning objectives to ensure fairness and provide students with clear benchmarks for success (Barata et al., 2013; Domínguez et al., 2013). However, recent studies caution against an overemphasis on measurable outcomes, as this may lead to a narrow focus that overlooks more qualitative or holistic aspects of learning (Chapman & Rich, 2018; Anderson & Dill, 2000). There is a growing recognition of the need to balance quantitative measures with qualitative assessments to capture the full scope of student learning and development (Yildirim & Demir, 2024; Sánchez-Martín et al., 2023).

Multimedia: The use of multimedia in gamified assessments can significantly enhance the learning experience by catering to different learning styles and making the content more engaging (Seaborn & Fels, 2015; Barata et al., 2013; Domínguez et al., 2013). Incorporating various media formats such as videos, animations, and interactive simulations not only diversifies the modes of learning but also improves comprehension and retention (Kapp, 2012; Huang & Soman, 2013; Nicholson, 2012). However, integrating multimedia elements must be done thoughtfully to avoid overwhelming students or distracting them from core learning objectives (Chapman & Rich, 2018; Seaborn & Fels, 2015). Recent research supports the idea that well-designed multimedia components can enhance learning outcomes, particularly in complex subjects that benefit from visual and interactive explanations (Lampropoulos & Sidiropoulos, 2024; Alenezi, 2023).

Connectivity (Two Es in GAME)

Evaluation & Feedback: Continuous and formative feedback is essential for maintaining student motivation and guiding progress in gamified assessments (Kapp, 2012; Hamari et al., 2014; Anderson & Dill, 2000). Effective feedback not only reinforces learning but also encourages a growth mindset by framing challenges as opportunities for improvement (Nicholson, 2012; Domínguez et al., 2013). The quality and timeliness of feedback are critical, as vague or delayed responses can lead to frustration and disengagement (Seaborn & Fels, 2015; Barata et al., 2013). Recent studies highlight the importance of providing specific, actionable feedback promptly to maximize its impact on student learning and motivation (Deterding et al., 2011; Chapman & Rich, 2018; Van Roy & Zaman, 2023).

Engagement & Interactions: Meaningful interactions within gamified environments are vital for sustaining motivation and fostering a sense of community among students (Seaborn & Fels, 2015; Domínguez et al., 2013; Barata et al., 2013). These interactions, whether with content, peers, or instructors, enhance the social dimension of learning and provide multiple sources of feedback (Ryan & Deci, 2000; Kapp, 2012; Hamari et al., 2014). However, the effectiveness of these interactions depends heavily on the quality of facilitation and the level of student participation (Chapman & Rich, 2018; Huang & Soman, 2013). Poorly facilitated interactions or superficial participation can lead to diminished learning experiences, emphasizing the need for thoughtful design and active facilitation to ensure that interactions are meaningful and contribute to learning objectives (Seaborn & Fels, 2015; Yildirim & Demir, 2024).

Discussion

The eight elements of the proposed GAME framework including 4Cs - Control (Gaming Objectives, Gaming Rules), Context (Adaptability, Associations), Components (Measures, Multimedia), and Connectivity (Evaluation & Feedback, Engagement & Interactions) - represent a comprehensive approach to designing gamified assessments aimed at enhancing student motivation and engagement. These elements align with existing gamification frameworks, such as Werbach and Hunter's (2012) emphasis on goal-setting and rules, but the GAME framework offers a more tailored application for educational contexts. The inclusion of SMART objectives within the Gaming Objectives element parallels the goal-setting components found in other frameworks, such as Deterding et al.'s (2011) work on gameful design. However, the GAME framework's balance between structured objectives and flexible pathways directly addresses critiques of the rigidity often associated with SMART goals, which have been highlighted as potentially limiting creativity and autonomy in learning environments (Dichev & Dicheva, 2017; Landers, 2014). This flexibility is increasingly recognized as essential in educational settings, as it allows for differentiation and adaptation to individual student needs, a critical aspect that traditional gamification models often overlook (Seaborn & Fels, 2015; Koivisto & Hamari, 2019; Xu, 2021).

The Context elements of the GAME framework—Adaptability and Associations—underscore the importance of personalizing learning experiences and ensuring that game mechanics are directly relevant to course content. This approach contrasts with frameworks like the Octalysis model (Chou, 2015), which, while focusing on core drives like empowerment and ownership, does not explicitly address the need for content alignment or adaptability in educational contexts. The emphasis on Adaptability in the GAME framework resonates with recent findings by Bodnar et al. (2016), who argue that adaptive learning systems are critical

for maximizing student engagement and learning outcomes. Furthermore, the need for strong Associations between gamified elements and learning objectives responds to concerns raised by Kapp (2012), who warned that poorly integrated game mechanics could diminish the educational value of gamification. This targeted alignment with learning outcomes is further supported by the principles of Cognitive Load Theory, which suggest that well-designed instructional materials can reduce cognitive load and improve learning (Sweller, Ayres, & Kalyuga, 2011; Van Roy & Zaman, 2018). Recent research has further corroborated this, demonstrating that contextual relevance in gamification enhances the transfer of knowledge and skills to real-world applications (Huang, 2022; Plass, Homer, & Kinzer, 2020).

The Components and Connectivity aspects of the GAME framework—Measures, Multimedia, Evaluation & Feedback, and Engagement & Interactions—further extend the principles found in frameworks like the Mechanics-Dynamics-Aesthetics (MDA) model (Hunicke, LeBlanc, & Zubek, 2004) and the Self-Determination Theory (Ryan & Deci, 2000). The inclusion of Multimedia as a key component acknowledges the diverse ways in which students engage with content, reflecting the importance of multimodal learning as highlighted by Mayer (2009) and further supported by recent studies that emphasize the role of multimedia in enhancing student engagement and understanding (Bai et al., 2020; Fiorella & Mayer, 2015; Tsai, 2021). Moreover, the GAME framework's focus on continuous and formative feedback within the Connectivity elements aligns with a growing body of research that underscores the critical role of timely and specific feedback in promoting student motivation and self-regulation (Hattie & Timperley, 2007; Nicol & Macfarlane-Dick, 2006). This structured application of feedback in educational assessments offers a significant improvement over broader gamification frameworks, which often lack detailed guidance on implementing these elements effectively in educational contexts (Nicholson, 2015; Hamari, 2019). The emphasis on formative feedback also aligns with current trends in educational technology, where real-time analytics and personalized feedback are increasingly being used to support student learning (Wang, 2022).

Limitations of Present Study and Suggestions for Future Research

There are limitations to this study that leave some questions unanswered. The GAME framework, while comprehensive, has yet to be empirically tested in diverse educational contexts. The reliance on existing literature for framework development means that the practical applicability and effectiveness of the framework in real-world settings remain to be fully explored. Additionally, the adaptability of the framework across different disciplines and student demographics has not been extensively examined, raising concerns about its generalizability.

Future research should prioritize comparative studies to assess the effectiveness of gamification across different educational contexts, disciplines, and demographics. Such research can identify discipline-specific impacts, such as its varying effectiveness across educational levels (e.g., undergraduate vs. graduate programs) (Seaborn & Fels, 2015; Kapp, 2012; Hamari et al., 2014). Cross-cultural comparisons are also crucial, as they can reveal how cultural backgrounds influence students' responses to gamification, helping to create more inclusive and adaptable educational strategies (Deterding et al., 2011; Van Roy & Zaman, 2023). Additionally, with the growth of online education, comparing the efficacy of gamification in online versus traditional classroom settings is increasingly important (Suh, Wagner, & Liu, 2015). Primary research is equally essential for providing empirical evidence and refining gamification strategies. Controlled experiments can isolate the specific effects of

gamification on student outcomes, while longitudinal studies can assess its long-term impact on knowledge retention and skill development (Hamari, Koivisto, & Sarsa, 2014; Van Roy & Zaman, 2018). Qualitative research, such as interviews and focus groups, can offer deeper insights into student and educator experiences with gamification, and mixed-methods approaches can combine these qualitative insights with quantitative data to create a more comprehensive understanding of gamification's impact (Nicholson, 2012; Huang & Soman, 2013). Action research, where educators iteratively implement and refine gamification strategies in their classrooms, along with technology-enhanced research exploring tools like AI and VR, can further advance the field (Kapp, 2012; Seaborn & Fels, 2015).

Conclusion

The proposed Gamified Assessment for students' Motivation and Engagement (GAME) framework offers a structured approach for designing gamified assessments that effectively enhance student motivation and engagement in higher education. This framework contributes significantly to addressing the gap in current literature regarding the design elements of gamified assessments, thus providing a valuable tool for educators aiming to improve student experiences through gamification. The GAME framework emphasizes the importance of the eight attributes in creating assessments that are not only engaging but also educationally valuable. By incorporating these elements, educators can design assessments that motivate students to perform at their best while also providing them with a deeper understanding of the subject matter. The GAME framework presents a novel approach to gamified assessment design, offering educators a structured methodology to enhance student motivation and engagement.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

In the preparation of this article, ChatGPT4o was employed to provide support in aiding summarising the research findings of the authors to be more concise. This is for the readability and language of the article. Human judgment was applied to verify the accuracy of the content and authors edited the results. The authors assume full responsibility for the content presented.

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