Advanced Gamification and Mega-games to Enhance Lifelong Learning in Higher Education

Mario Alberto Caudillo Melgoza
Tecnologico de Monterrey, Estado de Mexico, Mexico

mcaudillo@tec.mx

Abstract: This study investigates the effects of advanced gamification and Mega-games on student engagement and motivation within a rigorous semester-long course demanding 48 hours of weekly commitment. Conducted from February to June 2022, the research targeted sixth-semester students in Video Game Studies at Tec de Monterrey, with virtual classes for groups in Guadalajara and Querétaro. Using a mixed-method approach, the study employed participatory observation on the OASIS Discord server, incorporating gamification elements. Data collection also involved documentary research, online questionnaires, semi-structured group interviews, and faculty documentation reviews. Findings indicate that the integration of gamification elements effectively heightened student involvement and motivation, with positive feedback on instructor support and course content. However, challenges such as burnout, economic disparities, and varying engagement levels were identified. The study underscores the potential of gamification to enhance educational experiences while highlighting the need for careful management of challenges to prevent negative impacts on student well-being. Future research should focus on the psychological effects of continuous gamification and Mega-games, seeking to balance engagement with mental health considerations. Understanding these dynamics will be crucial for optimizing educational strategies and ensuring their sustainable application in diverse academic settings.

Keywords: Experiential Learning, Higher Education, Gamification, Mega-Games, Educational Innovation, Professional Education.

1. Introduction

Gamification has increasingly gained recognition within educational circles as a potent strategy to boost student engagement and motivation. While conventional gamification methods, typically featuring elements like storytelling, rewards, and leaderboards, have become widespread, they may not fully exploit the potential for more profound learning experiences. This paper aims to investigate advanced gamification techniques, particularly the incorporation of Mega-games, to cultivate lifelong learning in Higher Education (HE).

This research ventures into a more sophisticated gamification, defined by the application of less conventional game design elements within educational frameworks. It draws on the game design philosophies articulated by Jesse Schell in "The Art of Game Design: A Book of Lenses" (2019), with the intent of identifying novel gamification components that can positively influence educational environments. The academic focus is on exploring these elements more deeply to discover innovative methods of student motivation, while the professional interest, particularly within game and instructional design, lies in highlighting the advantages of integrating a game designer into the educational experience design team.

In recent years, the concept of Mega-games has gained prominence, offering a comprehensive approach to immersive learning experiences. Mega-games are an innovative and evolving phenomenon in the gaming world, blending aspects of traditional board games, role-playing games, and simulations to create expansive, immersive experiences (Iparraguirre, A., 2022).

For Digital Art majors in HE, it is essential that course design, implementation, and delivery are meticulously aligned with the intended learning objectives. These components must not only be appropriate for achieving the desired outcomes but also engaging and appealing to students. Furthermore, integrating real-world challenges that resonate with students can serve as a compelling motivator, driving them to actively engage in resolving contemporary regional, national, or global issues. This strategy not only enhances their educational experience but also instills a sense of purpose and relevance in their academic journey.

The central aim of this research is to evaluate the outcomes of implementing these strategies and to develop new gamification elements that can be leveraged in future studies. By exploring advanced gamification methods and embedding Mega-games within the learning process, this study seeks to promote lifelong learning among students.

Ernest Cline's *Ready Player One* serves as a vital source of inspiration for the storyliving element of the course, especially for a group of students who have directly felt the effects of a post-pandemic world. The novel's portrayal of an immersive virtual universe, where the boundaries between reality and virtuality are blurred,

aligns perfectly with the course's focus on exploring technologies that span these dimensions. This connection offers a relatable and visionary framework for students as they engage with cutting-edge technologies that mirror the book's digital oasis.

By integrating themes from *Ready Player One*, the course enhances its relevance and appeal, allowing students to deeply explore the spectrum between reality and virtuality. This immersive approach not only makes the learning experience more engaging but also equips students with the skills to innovate and navigate an increasingly interconnected digital landscape. Through this lens, students are inspired to envision and create solutions that reflect the transformative potential depicted in the novel, preparing them for future challenges in a digitally integrated world.

Also, this paper emphasizes the critical importance of cultivating soft skills such as communication, critical thinking, self-management, and collaboration. These competencies are vital for students to successfully navigate the complexities of modern and future careers. By embedding real-world issues into the learning experience, students are encouraged to engage actively in problem-solving, thereby enhancing the purpose and relevance of their educational journey.

2. Context

The educational landscape experienced a profound transformation in 2020 due to the COVID-19 pandemic, which necessitated a shift from traditional classrooms to virtual platforms like Zoom. This transition not only altered the delivery of education but also disrupted the social interactions among students, cutting off access to university facilities, advanced technological resources, and extracurricular environments. It became clear that learning extends beyond the physical classroom, prompting innovative strategies to facilitate education amidst these challenging circumstances.

Despite the challenges posed by the pandemic, important lessons emerged, demonstrating that knowledge acquisition is not confined to physical spaces. Creative solutions surfaced, enabling students and educators to collaborate and engage in learning experiences across geographical barriers. This period highlighted the limitations of telecommunication services while also showcasing the potential of video recordings to maintain educational continuity for all students.

The context of the activity takes place within the framework of the Tec21 educational model, specifically in a course module known as a "block." This block involves 24 hours per week of supervised class activities by the professor, spread over 15 weeks and divided into three periods with one week in between each. In addition to these supervised hours, students are expected to engage in 24 hours per week of asynchronous assignments, resulting in a total commitment of 48 hours per week.

The primary learning outcomes for this activity include the development of critical thinking, systemic thinking, project production in art and technology, project costing, and the management of human and technological resources for projects of varying scales. These projects utilize technologies within the spectrum of reality and virtuality, such as augmented reality, virtual reality, mixed reality, augmented virtuality, and integrated reality. Students will also gain insight into working within specific departments of experience creation, whether as producers, designers, developers, or artists. This activity is conducted for sixth-semester students in the Digital Art Bachelor's program, involving 35 students aged 20-22 from various cities in Mexico. They are divided into two virtual regional groups, each taught by three professors.

2.1 Student Motivation in Higher Education

Seifert (2004) underscores the importance of creating learning environments that encourage creativity, autonomy, inclusion, and active student participation in the learning process, all of which are key drivers of motivation at various academic levels.

The responsibility for enhancing student motivation often falls on educators, which can lead to passive engagement from students. However, intrinsic motivation, defined by a genuine desire to learn and active participation, is equally essential (Williams-Pierce, 2011). Although there is no universal formula for fostering student motivation, Williams-Pierce (2011) identifies key factors: 1) the willingness of students to learn, 2) effective rapport and guidance from instructors, 3) content that captivates student interest, 4) presentation in an engaging manner, and 5) the creation of an inclusive and innovative environment that nurtures both learning and creativity.

In higher education, maintaining student motivation is crucial and should be a priority for educational institutions. Rizkallah and Seitz (2017) stress the importance of strategic focus throughout a student's academic journey—from discovery and establishment to engagement and forward-thinking phases—with faculty support being pivotal for improving retention rates.

On a classroom level, student motivation is a complex challenge. Liu, Bridgeman, and Adler (2012) note that college learning encompasses more than just traditional assessment metrics; it spans a wide range of disciplinary subjects. They observe that motivated students tend to perform better in evaluations and acquire a deeper understanding of the material. Educators in higher education must value student perspectives, encourage active input, and cultivate creativity to drive motivation toward the desired learning outcomes.

Incorporating games, such as Mega-games, can be a valuable tool in this effort, offering innovative pathways for engagement and learning.

2.2 The Role of Gamification in Higher Education

Gamification, as conceptualized by Deterding et al. (2011), involves the application of game design elements in non-game contexts to enhance engagement, motivation, and behavior. This approach leverages the captivating and often addictive nature of games to influence and improve educational experiences (OIE, 2016). Games are designed to be engaging, encouraging persistence and creativity in overcoming challenges, which can foster problem-solving skills and a mindset conducive to learning (Teng & Baker, 2014).

Prominent figures in the field, such as Jane McGonigal (2011), emphasize that games create enjoyable learning environments by offering opportunities for trial-and-error learning, immediate feedback, and social interaction (Hertz, 2013). This immersive experience can lead to persistent engagement and strategic thinking beyond the game itself (Kiang, 2014). Historical milestones, from Thomas W. Malone's early work on intrinsically motivating computer games (1981) to Nick Pelling's coining of "gamification" (2003) and Jesse Schell's contributions in "The Art of Game Design" (2019), have shaped the evolution of gamification.

Despite its benefits, recent studies highlight the need for a critical examination of gamification's limitations. Li, Yang, and Hu (2024) identify a U-shaped relationship between competition in gamified systems and technological exhaustion, suggesting that excessive competition can lead to increased fatigue. This underscores the importance of balancing competitive elements to avoid adverse effects on users. Similarly, Prieto-Andreu (2024) reviews various negative impacts of gamification in education, such as the novelty effect and overjustification, and proposes an instructional model to address these challenges. Their insights emphasize the necessity of careful design and ethical considerations to prevent negative outcomes while leveraging gamification's potential.

While gamification has the potential to enrich educational experiences by enhancing engagement and motivation, it is essential to critically assess and address its limitations. Understanding both the positive aspects and potential drawbacks of gamification can lead to more effective and balanced educational strategies, ensuring that gamified approaches contribute positively to student learning and development.

2.3 Mega-games in Higher Education

Playing is a fundamental aspect of human nature, deeply rooted in our instincts. Huizinga (1955) notes that play predates culture, underscoring its essential role in human life. Play brings joy and fulfillment, embodying structured elements such as goals, rules, feedback systems, and voluntary participation (McGonigal, 2011).

Mega-games are an innovative and evolving phenomenon in the gaming world, blending aspects of traditional board games, role-playing games, and simulations to create expansive, immersive experiences. Unlike conventional board games or simulations, Mega-games involve a significantly larger number of participants, often ranging from 20 to over 100 players, each assuming unique roles within a complex, interactive setting.

At their essence, Mega-games are intricate events where players engage in both cooperative and competitive activities over extended periods. These games are crafted to replicate intricate scenarios such as geopolitical conflicts, economic systems, or historical events. Each participant or group is assigned a specific role with particular objectives, powers, and resources, contributing to a dynamic narrative that evolves with both collective and individual actions.

Similar to board games, Mega-games have structured rules and objectives that provide a framework for player interactions. Both formats require strategic thinking, resource management, and decision-making. However,

while board games typically involve a smaller number of players around a table, Mega-games significantly expand in scale, accommodating many more participants across larger spaces, sometimes extending into multiple rooms or areas.

Mega-games also share common ground with simulations, as both aim to replicate real-world scenarios and systems. Participants assume roles and make decisions based on their understanding of the scenario. However, while simulations often focus on accuracy and educational outcomes, closely mirroring real-world processes, Mega-games blend realism with gameplay elements to ensure a dynamic and engaging experience. Although educational goals can be part of Mega-games, their emphasis on player interaction and narrative development distinguishes them from simulations.

What differentiates Mega-games from other gaming formats is their scale and complexity. The involvement of dozens to hundreds of players introduces a level of unpredictability and interactivity unattainable in smaller games. The roles in Mega-games are often asymmetrical, meaning players have varying degrees of power, information, and objectives, creating a rich tapestry of interactions and negotiations.

Moreover, Mega-games are highly versatile and can be customized to fit a range of themes and scenarios, from historical battles to futuristic political landscapes. This adaptability allows for a wide array of creative and educational uses, making them suitable for various audiences, including educational institutions, corporate training sessions, and gaming communities.

Mega-games offer a distinct and engaging form of entertainment that bridges board games, simulations, and large-scale interactive experiences. By integrating elements of strategy, role-playing, and real-world simulation, they provide a robust platform for exploring complex scenarios in an immersive and collaborative setting. Recognizing the unique features of Mega-games enhances their application and enjoyment, offering participants a rich and memorable gaming experience.

Resource management is a key element in Mega-games, where players must make strategic decisions based on limited resources such as money, technology, information, or materials (Rycroft-Smith, 2016). While they are primarily a form of entertainment, Mega-games have also been recognized as valuable educational tools, as demonstrated by examples like Shawn McMillan's "ALLIANCE" (2015) and Ted Castronova's "VIRUS: Bunny Apocalypse," both implemented in the United States.

Moreover, Mega-games have been utilized in academic settings to engage students in real-world experiences and role-playing, such as the Climate Change Mega-game at Linköping University in 2020, contributing to ongoing research on interactive learning methods.

In contrast, as we explore the context of this paper, research on Mega-games in Mexico is still emerging. Notable contributions include the work of Mexican developers like Robledo-Rella et al. (2017) with "Cocogame" and González & Montalvo (2018) with the "BluRabbits" platform, showcasing innovative approaches to creating immersive learning experiences for students at institutions like Tecnológico de Monterrey.

The implementation of Mega-games in education, as highlighted by Martínez et al. (2023) in their research titled "Kuxtal: Student Motivation Through Mega-games in Higher Education Design Students," presents a significant opportunity. Developed at the same university in which the present work focussed, this implementation yielded positive outcomes, demonstrating the potential of Mega-games as a playful and effective approach to addressing complex challenges. By integrating educational innovations that boost student motivation and engagement, Mega-games like Kuxtal promote collaboration, critical-creative thinking, and real-world actions among students, influencing their immediate contexts and disciplines.

3. Methodology

The methodology for this research was shaped by the necessity to motivate students in a demanding course which spans through all semester long and needs a commitment of 48 hours of work per week. The research employed a mixed-method approach to measure student commitment and motivation following the implementation of advanced gamification elements during the February to June 2022 period in the New Realities course. The study targeted the sixth semester of Video Game Studies in the Digital Arts Bachelor's program at Tec de Monterrey, with two groups based at the Guadalajara and Querétaro campi, conducted virtually.

The research aimed to evaluate advanced gamification, Mega-games, and their impact on motivation and commitment to learning by assessing both student and faculty experiences. Data collection methods included:

Participatory Observation - took place from February to June 2022. The interaction occurred within a platform called OASIS, a Discord server configured with both groups' six implementing professors and a total of 35 students, divided into two groups of 16 and 19 students respectively. The MEE6 plugin was used on this server to incorporate many features and tools of the advanced gamification such as virtual currency, experience points, roles and secrets. The server included statistical participation data, and a leaderboard based on engagement levels within the OASIS.

Documentary Research - involved searching the Scopus database curated by Elsevier from 2019 to 2023, analyzing implementation data and results for each case to develop the best gamification and mega-game taking in consideration the results.

Online Questionnaire (Caudillo, 2022) - structured into three main parts:

Demographic Information: Collects data on age, campus, group enrollment, gender, pre-semester enthusiasm and motivation, and attitudes toward continuing in a virtual format. It also inquires about the participant's level in OASIS and their player type according to Richard Bartle taxonomy (1996).

Advanced Gamification Analysis: Evaluates participants' responses using a Likert scale to assess their perceptions of gamification elements, such as the impact of gamification, the effectiveness of storyliving elements, the utility of Discord, and the enjoyment and curiosity generated by the gamified experience. It includes open-ended questions about enjoyable and unenjoyable aspects, motivations, and the impact of gamification on participation and skill development.

Overall Experience and Future Improvements: Gathers opinions on whether the gamified experience enhanced motivation and commitment compared to other blocks and semesters, suggestions for improvements, overall motivation, and participation in additional activities prompted by the gamification approach.

Semi-structured Group Interviews - aimed to explore students' reactions to their previous semester's gamified experience, focusing on what they liked and disliked. It also assessed whether gamified courses increased their commitment compared to traditional formats, sought suggestions for improvements, evaluated the effectiveness of the implementing teachers versus others, and discussed the appropriateness of the challenges and grading methods.

Student Opinion Survey - evaluates the professor's expertise, challenge level, promotion of a supportive environment, adequacy of support, overall learning experience, and interactions within the virtual Tec model. It also seeks comments for future students considering the course with the same professor.

Documentation Review Interviews with Faculty Members - A meeting will be held with the implementing professors this semester to gather data on their observations of the semester, the design of the New Realities course, and the gamification elements integrated to motivate students in the game design area..

An inductive analysis method was applied to specific elements of the implementation to draw broader conclusions about the effectiveness of advanced gamification and Mega-games in higher education settings.

3.1 Course Design

The course design, developed by Carlos Astengo, Lorena Martínez, and Mario Caudillo, proposed an immersive experience integrating gamification elements and Mega-games to foster the cross-competence of collaboration. The design drew inspiration from the narrative universe of Ernest Cline's *Ready Player One* because of the relation of topics treated in class and in this science-fiction book.

The implementation spanned two regional groups, each guided by three professors. Mario Caudillo led one group, while Diego de la Mora led the other. These coordinators collaborated to utilize the platform for the Mega-game and conducted joint classes with students from both groups to explain its operation.

The course was divided into three modules:

1. The Creative Planet: This module focused on creatively publishing in reality-virtuality continuum, such as games and applications in augmented reality, extended reality, virtual reality, integrated reality, augmented virtuality and mixed reality, requiring students to implement at least two forms of these technologies. The title of the course "New realities" referred this reality-virtuality continuum as the "new realities".

2. The Video Game Planet: This module concentrated on the pre-production phase of the students' capstone projects, which they would continue developing over the next two semesters and deliver as their final terminal project of the Bachelor in Digital Arts.
3. Sector 18: Planet Doom: This module involved the Mega-game, simulating a professional work environment in which students need to participate with four different roles in four different projects, gaining Prestige virtual currency as if they are in real-life, mechanics as tax payments and freelance work negotiation were some of the activities experienced by students in this module.

Students were immersed in the following narrative, which set the stage for the course:

Mexico - Year 2045. Following misguided pandemic management policies since 2020, the world faces a bleak reality. Many people seek to escape this reality, and you will be their hero, showing them that they can go to another place without even moving. In this course, you will see the future and build it, giving people a place called OASIS, where the boundaries of reality are those of your imagination. You can go anywhere, create anything, like the Video Game Planet for your capstone project or the Creative Planet to publish and share new realities. Or face the challenges of professional life in Sector 12: Planet Doom. In OASIS, you can be anything or anyone, creating the reality you want. Welcome to New Realities. Ready Player One?

3.2 Gamification and Mega-game Design

In the first seven weeks, the platform, referred to as the OASIS, allowed students to accumulate virtual currency called Prestige, which governed the Mega-game's economy, this economy also has a 10% of the course's final grade. Participation earned students experience points, unlocking features as they progressed.

Students focused on wealth accumulation, logging their class hours using the "/work" command in the Mega-game and earning Prestige as payment, this could be seen as their work hours, when they use this command, admin roles got the notification and could ask for what they are working at, if the students lied about working when they are not working they got a fine in Prestige.

The final eight weeks simulated the professional work environment. Students worked on four distinct projects to meet course competencies, assuming various roles such as artist, developer, designer, and producer. The producer role was pivotal in ensuring the smooth operation of the OASIS, as they generated jobs to fulfill the roles of other students.

Producers selected projects from a Job Board, defined project scope, resources, budget, payment agreements, and timelines, and presented this to the simulation board, consisting of at least three of the six professors. Upon approval, the board allocated 50% of the necessary Prestige virtual resources. The producer then recruited a team and commenced work, followed by a project closure and post-mortem meeting to assess project completion and requirements.

4. Results

The central aim of this research is to evaluate the outcomes of implementing personalized attendance tracking within the Tec21 educational model and to develop new gamification elements that can be leveraged in future studies. By exploring advanced gamification methods and embedding Mega-games within the learning process, this study seeks to promote lifelong learning among students. Additionally, the study emphasizes the importance of cultivating soft skills such as communication, critical thinking, self-management, and collaboration, which are crucial for navigating the complexities of modern and future careers. By embedding real-world issues into the learning experience, students are encouraged to engage actively in problem-solving, thereby enhancing the purpose and relevance of their educational journey.

In analyzing the effectiveness of these strategies, we employed the categorization framework established by Williams and Pierce (2011) to assess student motivation and engagement. This framework was chosen due to its comprehensive identification of key factors that contribute to fostering intrinsic motivation, an essential element for active and meaningful student participation in academic settings. According to Williams and Pierce (2011), while educators bear the responsibility of enhancing student motivation, true engagement stems from a combination of student willingness, effective instructor-student rapport, captivating and well-presented content, and an environment that promotes inclusivity and creativity.

4.1 Willingness of Students to Learn

Quantitative data revealed that students felt challenged to develop new skills and concepts, with an average score of 8.9 and a standard deviation of 1.2. Additionally, initial sentiments and motivation data indicated that 64% of students reported positive sentiments and high motivation levels at the start of the semester. Qualitatively, this willingness was further evident in the use of gamification elements, such as rewards and constant challenges, which increased engagement and motivation. However, some students experienced burnout due to the continuous nature of these challenges, suggesting that excessive stimuli can negatively affect the willingness to learn.

4.2 Effective Rapport and Guidance from Instructors

Students rated their instructors highly, with an average score of 9.1 and a standard deviation of 1.24, indicating effective guidance and a strong rapport between students and teachers. The adequacy of support and feedback was also highly rated, with an average score of 9.0 and a standard deviation of 1.5, underscoring the importance of continuous and effective guidance. In the model of virtual education delivered by Tec de Monterrey, even remote interactions between students and instructors were positively evaluated, with an average score of 8.9. Peer and professor interactions were largely positive, though some students found the constant connectivity burdensome or had issues with the platform's interface.

4.3 Content that Captivates Student Interest

The overall learning experience was rated with an average of 8.1 and a standard deviation of 1.88, reflecting that, while the content was generally engaging, there was variability in how it captured students' interest. Gamification elements, such as Prestige virtual currency and a leaderboard, effectively captured the interest of many students. However, the competition and stress associated with these elements also led to anxiety and disinterest in some cases. The "Ready Player One" narrative elements integrated into the course also received mixed reactions, with 36% of students responding positively, 36% neutral, and 28% negatively, indicating varying degrees of immersion and engagement.

4.4 Presentation in an Engaging Manner

Students felt that the content was presented in a way that fostered a positive and respectful environment, with an average score of 9.1 and a standard deviation of 1.2. This positive environment was crucial for maintaining interest and engagement. However, some students reported that restrictions on how they could interact on the communication platform made the experience less enjoyable and more linear, negatively impacting the presentation and enjoyment of the course. Moreover, the overall enjoyment of gamified experiences was mixed, with 41.6% of students holding negative opinions, 41.7% neutral, and 16.6% reporting enjoyment, suggesting that the presentation's effectiveness varied.

4.5 Creation of an Inclusive and Innovative Environment

The virtual education model enabled inclusive interaction in a remote setting, with a score of 8.9, reflecting efforts to create an inclusive environment, though there is room for improvement. Qualitatively, the use of a Mega-game simulating a video game studio allowed students to experiment with different roles in a highly inclusive and creative environment. However, challenges such as economic disparities emerged, with issues arising from the rapid accumulation of virtual currency and wealth disparities by the 14th week. Additionally, the emergence of social classes within the OASIS highlighted limitations in the perception of inclusivity, necessitating thoughtful design and implementation to balance gamification with educational goals.

5. Conclusions

The research into advanced gamification elements and Mega-games within an immersive post-pandemic educational setting has yielded several important conclusions regarding their effectiveness in enhancing student engagement and motivation. The integration of these elements, particularly through platforms like Discord, has proven to be a significant factor in fostering student commitment, collaboration, and competition. The immersive nature of the OASIS platform, with its hidden surprises and dynamic challenges, effectively sparked curiosity and motivated students to actively participate in their learning. However, aligning these challenges more closely with project details could further optimize learning outcomes.

Random dynamics, requiring students to engage frequently with the platform, successfully increased their commitment. However, the research also highlighted the need for safeguards against potential negative consequences, such as the risk of gambling addiction, necessitating the implementation of limitations to mitigate harm. Additionally, the study found that preventive measures against "farming" experience points helped students focus on meaningful content, fostering a more authentic commitment to their educational experience.

The use of rewards to incentivize extra-academic activities was particularly effective in generating commitment and emphasizing the importance of continuous learning. This approach underscored the value of lifelong learning and the ongoing development of skills, particularly through platforms like MOOCs. However, the study also revealed the challenges associated with balancing assessment pressures with the overall educational experience, especially among students with scholarships. This finding underscores the importance of creating a supportive environment that maintains motivation and well-being.

In a global context, the research provided a comprehensive understanding of how gamification is implemented worldwide, identifying both well-established and novel elements. By comparing these elements with previous implementations, the study offered valuable insights into their effectiveness and potential to enhance student motivation. This research supports the hypothesis that advanced gamification elements can be successfully implemented across different educational contexts, marking a new frontier in gamification with the potential to improve student engagement and motivation.

The findings of this study offer valuable guidance for educators and practitioners interested in implementing advanced gamification. By exploring new elements and tailoring them to specific educational contexts, student motivation and engagement can be significantly enhanced. The study encourages continued innovation in gamification, suggesting that these advanced elements can lead to sustained motivation and improved learning experiences.

5.1 Implications for Future Implementation

Future research should focus on understanding the potential impacts of prolonged exposure to continuous stimuli from gamification and Mega-games, particularly in intensive implementations that demand up to 48 hours of weekly engagement. While these methods can significantly boost motivation and engagement, the nature of the challenges and the relentless demand for interaction may pose risks to students' well-being, including heightened stress, anxiety, and burnout.

Exploring the psychological effects of extended gamification is crucial, as continuous engagement may have unintended consequences on students' mental health. It's essential to identify the balance between healthy engagement and overexposure to avoid negative outcomes. Equally important is the need to critically examine the ethical implications of using such immersive and competitive methods. Educators and institutions bear the responsibility of safeguarding student welfare, ensuring that the intensity of these activities does not lead to harmful dynamics or compromised well-being.

A critical analysis of the effectiveness of these approaches is also necessary to determine whether the educational benefits justify the potential costs to students' health. It is important to question whether alternative methods could achieve similar outcomes without the associated risks. Furthermore, understanding the long-term effects of these educational strategies on students' learning perceptions, resilience, and sustained engagement is essential for assessing the sustainability of gamification and Mega-games in large-scale educational settings.

Addressing these concerns will provide a more nuanced understanding of the implications of these innovative approaches, ensuring they enhance student learning without undermining their health or well-being.

Declaration of Interest

This is to acknowledge that the authors report there are no competing interests to declare.

Acknowledgements

We want to acknowledge the technical and financial support of the Writing Lab, Institute for the Future of Education, Tecnológico de Monterrey, Mexico, in the production of this work.

References

Bartle, R. (1996). *Hearts, clubs, diamonds, spades: Players who suit MUDs*. Journal of MUD Research. Retrieved from http://www.mud.co.uk/richard/hcds.htm

Caudillo, M. (2022) Online questionnaire given to students to recollect data. Retrieved from https://forms.gle/yYvESFiHCzq1p7W49

Chitroda, H. (2015) A Brief History on gamification. Knolskape [blog]. Retrieved from https://knolskape.com/brief-history-gamification/

González Moreno, S. and Montalvo, C. (2018). La gamificación en la educación superior mexicana: un estudio exploratorio. Gamificación en Iberoamérica Experiencias desde la comunicación y la educación. Editorial Universitaria Abya-Yala.

Hertz, M. (2013). Games can make "real life" more rewarding. Edutopia. Retrieved from http://www.edutopia.org/blog/games-make-real-life-rewarding-mary-beth-hertz

Huizinga J. (1955). Homo ludens: a study of the play-element in culture (First Beacon Press paperback). Beacon Press.

Iparraguirre, A. (2022). Curso de actualización de la disciplina (CADI) Megajuegos en espacios de aprendizaje, Universidad de Buenos Aires, Universidad de San Andrés, Ministerio de Cultura de la Nación Argentina.

Kiang, D. (2014). Using Gaming Principles to Engage Students. Edutopia. Recuperado de: http://www.edutopia.org/blog/using-gaming-principles-engage-students-douglas-kiang

Li, D., Yang, H., & Hu, Z. (2024). Exploring the ineffectiveness of gamification health management: A U-shaped relationship between competition and technological exhaustion. *Information Technology and People, 37*(3), 1229–1250.

Liu, O. L., Bridgeman, B., and Adler, R. M. (2012). Measuring learning outcomes in higher education: Motivation matters. Educational Researcher, 41(9), 352-362.

Malone, T. (1981). What Makes Things Fun to Learn? A Study of Intrinsically Motivating Computer Games. Pipeline. 6.

Martínez, E., Olivas, E., Ramírez-Cavazos, I. (2023) Kuxtal: Student Motivation Through Mega-games in Higher Education Design Students. Proceedings of the 17th European Conference on Games Based Learning. 390-400.

McGonigal, J. (2011). Reality is broken: why games make us better and how they can change the world. London :Jonathan Cape

McMillan, S. (2015). 60+ Students Play ALLIANCE Political Science Mega-game - Trailer [Video]. YouTube.

OIE (Observatorio de Innovación Educativa). (2016) Gamification. Tecnológico de Monterrey.

Prieto-Andreu, J. M. (2024). Cómo evitar efectos negativos al gamificar en educación: Revisión panorámica y aproximación heurística hacia un modelo instruccional. *Multidisciplinary Journal of Educational Research, 14*(2), 244–266.

Rizkallah, E. G., & Seitz, V. A. (2017). Understanding student motivation: A key to retention in higher education. Scientific Annals of Economics and Business, 64(1), 45-57.

Robledo-Rella, V. and Garcia-Castelan, R. and Medina Herrera, L. and Ramirez de Arellano, J. and Guerrero, I. (2017). CocoGame: A funny app to learn physics and math. 1-4.

Rycroft-Smith, L. (2016). The Mega-game of thrones. The Times Educational Supplement, (5192).

Sailer, M., Homner, L. (2020). The gamification of learning: a meta-analysis. Educational Psychology Review, 32(1), 77-112. https://doi.org/10.1007/s10648-019-09498-w

Schell, J. (2019). The Art of Game Design: A Book of Lenses. Tercera edición. Carnagie Mellon University and Schell Games. Pittsburgh, Pennsylvania, USA.

Seifert, T. (2004). Understanding student motivation. Educational research, 46(2), 137-149.

Teng, K., y Baker, C. (2014). What Can Educators Learn from the Gaming Industry?. Edutopia. Retrieved from http://www.edutopia.org/blog/educators-learn-from-gaming-industry-kelly-teng

Williams-Pierce, C. C. (2011). Five key ingredients for improving student motivation. University at Albany.