**Literature Review: Gamification**

Christina Bardine

School of Education, Liberty University

**Author Note**

Christina Bardine

I have no known conflict of interest to disclose.

Correspondence concerning this article should be addressed to Christina Bardine

Email: cbardine@liberty.edu

# Abstract

Inserting educational technology in today's climate of teaching has become a certainty for teachers and students alike. Technology is all around; by harnessing a student's potential using various educational games, tools, and strategies in an engaging way, develop collaborative and problem-solving skills that can carry a student forward for a lifetime.

*Keywords*: e-learning, Behavior, Classroom Management, Technology, Gamification

**Literature Review: Gamification**

Technology has become a fixture in our everyday lives, including education. Whether we use those technologies to search for information, develop our programs, or even play video games, technology is inserted in everything the human race does. At the same time, as a gamer myself, inserting game mechanics into our daily routines has become common in our home and at work. Gamification can be a motivation to accomplish daily tasks, improve learning, and affect human behavior. However, the existing literature on gamification is limited to primary research addressing education in the classroom and work environments. If gamification were to be implemented in specific settings of our choice, what would be the overall impact on the whole student?

**Keywords and General Terminology**

 It is essential to understand what gamification is and the terminology used in describing various aspects of it. To many people, Gamification in Education is mistakenly referred to as taking a game and building curricula around it, and now it is shown to becoming a multi-disciplinary field (Nacke & Deterding, 2017). While that may be a small component, it goes beyond education and has been often used in Business, Computers, Technologies, and other themes.

**Gamification**

Gamification is defined as taking game mechanics and applying them to non-gaming situations (Nacke & Deterding, 2017). Within gamified systems, it employs mechanics that make it work. Landers (2019) described gamification as a design process to identify and add game elements to an existing system in an impactful way. In modern times, e-learning seeks to bridge the geographical distance between instructor and learner through technology (Rodrigues et al., 2018). Gamification can increase student engagement, motivate and promote learning, and allow students to focus on life skills (Buckley & Doyle, 2017). Vesa and Harviainen (2019) say that the driving force behind gamification is incorporating work and play.

**Mechanical Terms**

 Utilizing these mechanics, like badges, achievements, and points systems engages learners' motivations to continue their work or studies. Buckley and Doyle (2017) provided basic definitions of some of these mechanics based on their research on behavior utilizing trade applications that incorporated game mechanics. For example*,* avatarsare images associated with a user profile. Achievements definition describes completing a goal, while *badges* refer to visual rewards for reaching those milestones and achievements (Buckley& Doyle, 2017). Quests are related to the tasks or services to be completed and rewarded with experience points. These experience points branch into competition for leaderboards*,* ranking systems, and leveling for more perks (Buckley& Doyle, 2017). Teams or groups can be helpful to assist in tasks for additional points, camaraderie, and networking for the exchange of communication, gifts, and virtual goods(Buckley& Doyle, 2017).

**Psychological Terms**

 Gamification refers to human behaviors and the user's adaptability to change their behavior to fit into the mechanics or rules of gameplay. Mullins & Sabherwal (2020) defines Cognition as mental activities about the acquisition and application of knowledge and processes, including attention, learning, language processing, problem-solving, and memory. Emotions are defined as a "mental state of varying intensity representing evaluative reactions to environmental stimuli" (Mullins and Sabherwal, 2020, p. 306). Finally, Sailer and Homner (2020) described self-determination theory as the psychological needs, such as autonomy, competence, and user's social relatedness when a design is deployed successfully.

**Review of Literature by Themes**

 The literature reviews covered a wide range of topics that addressed system mechanics, directing the user to behave in a manner considered acceptable within the rules and regulations of the gamified system. The various research methods and data collection each has a component of developing an answer to the question, "what is the overall impact of gamified environments in education?" (Nacke & Deterding, 2017, p. 451) Throughout the literature review, several common themes were consistently present throughout the literature.

**Various Research Questions**

Rapp et al. (2019) noted that research in gamification became a slow progression of improving research and building knowledge. Many studies would usually ask similar questions that would be considered broad or provide simple test methods but do not answer complex issues. While research into gamification has increased in recent years, the lack of questions and researching complex matters has not allowed the study of gamification to mature and grow. The lack of growth and knowledge would lead to poor design (Nacke & Deterding, 2017). Landers (2019) discusses how some gamified developments would be implemented due to the *hype cycle*. The *hype cycle* is defined as "technology or techniques overpromised by the creators and evangelists, resulting in irrational faith of the practices."

During his study, Hamari (2017) asked, "Do badges increase user activity?" This question was more developed explicitly toward a specific application, with a particular gamified element, with pre-deployment and post-deployment data to see the differentiation of usage in the groups. As mentioned before, Buckley & Doyle (2017) defined *Badges* as a visual reward for achievement. Hassan et al. (2021) took it a step further and incorporated Gamification in E-learning and how it would motivate them to complete their tasks while also addressing the social and collaboration gaps by bringing students of different abilities together to accomplish a task. The primary questions were (1) How can the system effectively identify different learning dimensions of the learner? (2) How can the system provide adaptive gamified activities according to the learner's type? (3) Can adaptive gamification enhance course completion rates, extrinsic motivation, intrinsic motivation, and collaboration among the students?

**Participants**

 The study participants throughout multiple studies varied by ethnicity, faith, and gender. However, the commonality of the participants was their age and geographical locations outside the Continental United States. The majority of the studies reviewed had participants over 18 or considered adults in various countries. In the study featured in "*Do Badges Increase User Activity? A Field Experiment on the Effects of Gamification*," Hamari (2017) identified college students were the primary users for the study within a cohort at a Finnish university. Kocadere & Çağlar (2017) identified their sample as Undergraduate students in Computer Education and Technology spread amongst seven universities and narrowed the field down to 41 participants by phase four. Hamari (2017) also identified the lack of adequate sampling sizes of gamification studies completed prior.

**Research Methods**

 With the question of "What is the overall impact on the student in a gamified environment?" A student is assessed for academic achievements by their grades and grade point average and the entire class's median grade difference between implementation periods. From a quantitative view, a student's grades can be primary data; however, when assessing the student's overall behaviors in the gamified environment, that will take on qualitative research using surveys and interviews from faculty and students to create case studies on behaviors in the classroom. However, with gamification, it is easy to have a mixed method of approach to answer questions yet have one dominant research method over the other.

 For example, in the qualitative literature *"Gamification From Player Type Perspective: A Case Study."* Kocadere and Çağlar (2017) began their study to identify what mechanics are dominant in certain players and how they play into their psychological profile. They began using quantitative measurement tools like Bartlett's Sphericity Test and Kaiser Meyer-Olkin measure and evaluated using Chi-Square. However, these measurements are typically quantitative measurements that lead to qualitative research, resulting in behavioral case studies. Thus, most research into gamification is a multi-discipline study that needs to be narrowed to specific questions of the research. Surveys and questionnaires completed the majority of the qualitative research about their experiences in the gamified environments.

 The quantitative literature *"Do Badges Increase User Activity? A Field Experiment on the Effects of Gamification,"* Hamari (2017) discusses the differences of conducting experiments on live applications versus a lab-created one; due to that, the participants knowing the application is not natural and will adjust their behaviors, increasing the risk of human error. The timelines for the studies vary; however, they would have depended on design and how much information is needed to bring a conclusive result. Therefore, the data was evaluated and analyzed by t-test to show the differences amongst the pre-and post-deployment users. In addition, the MANOVA effects were assessed through an ANOVA test to observe the single-use variable versus the multiple-use variable.

Rapp et al. (2017) discuss Self-Determination Theory (SDT) and how this can be researched using experimental case studies like the case study on player types. The article continues using these case studies to examine human behavior in these environments, such as weekly challenges, badges, and competitions. What their literature have found was the learner felt their experiences were autonomous, engaged, and satisfying. Hassan et al. (2021) also discussed SDT to achieve goals from the tasks the student completed.

Hassan et al. (2021) address the social and collaborative aspects that are lacking in education. Using electronic learning or *e-learning* provides broad access to education and collaborative efforts between individuals around the world using Massive Open Online Courses (MOOC). The focus of this study was primarily on rewards, feedback, and progression. The student is assigned tasks based on the perceived player type and tracked using an interaction log that recorded activities, time spent, and completion rate.

**Psychology and Student Behavior**

Gamification, as mentioned before, is a multi-disciplinary area of study that covers various industries, including human behavior and development. Looking at gamification from a social, cognitive, and psychological perspective adds more pieces to the larger picture, the whole student. While quantitive studies on human performance are lacking, student behavior linked to gamified studies has increased. Mullins and Sabherwal (2020) noted previous studies of the psychological outcomes viewed as cognitive motivation processes. The overall results targeted were increased attention, engagement, and improving decision-making skills.

 When implementing a gamified environment, it is vital to ensure the experience is enjoyable; as part of any life experience, the learner will have several positive and negative outcomes in their environment to reach the desired goals and results (Mullins & Sabherwal, 2020). In addition, some individuals can have positive and negative experiences depending on what mechanics are engaged and the personality or player type.

 Player types in gamification can depend on what mechanics are more attractive to the individual. Earlier mentioned, some of these mechanics are typically used in the gaming world to apply to education and business as an example. Kocadere & Çağlar (2017) discusses their case study to determine what mechanics are attractive to each type. While their research focused on single mechanics that would fall under a specific player type, they chose not to address any cross traits that some participants can adapt and work within the confines of the rules and mechanics of the environment. Nacke & Deterding (2017) also identifies that there is much more to explore as far as human behavior in gamified environments.

 Kocadere & Çağlar's (2017) case study on player types is more role-based. However, Hassan et al. (2021) developed player-types similar to their behaviors within the environment. For example, the "Global" participant in the Hassan study would be equal to Kocadere & Çağlar's "Explorer" play-style. The main difference between these two studies is that some of the cross-traits mentioned earlier were addressed in the Hassan study and focused on the Self-Determination Theory.

**Myths of Gamification**

According to Mullins & Sabherwal (2020), failed efforts to gamify learning outcomes were estimated at 80%, primarily due to poor game design. However, the game design can engage specific emotional results from experience. Nacke & Deterding (2017) emphasize that studies are being conducted on whether gamification works, theories are overtested, and the redundancy lacks knowledge return. Nacke & Deterding (2017) instead says that studies need to advance into the stages of testing the paradigms and explore the mechanics in detail. That is where game designs fail when researchers do not understand gamified mechanics or have little field knowledge. Vesa & Harviainen (2019) argue that knowing when to incorporate it is equally important and the design of the gamified environment.

Landers (2019) caution those looking to incorporate gamified mechanics into their practices to know and understand the difference between true Gamification and rhetorical or "fake" Gamification. Developers have included game elements into their programming to give the appearance of true gamification to sell. Still, it lacks a well-developed design leading to a failed implementation. However, the evidence still shows legitimate gamification does work when the gamified system is sound.

**Summary**

 Based on the studies and literature reviewed, some points are consistent about the research gaps. For example, research into game theories in the younger participants in the PK-12 with parental permissions would be beneficial in managing a classroom. In addition, while the literature mentions psychology and social constructs within the learning environment, the author would like to see how using gamified mechanics in classroom management would decrease the interruptions of instruction. This question is primarily due to potential student negative behaviors overall, especially with students with 504s, IEPs, and Behavioral Intervention Plans.

While several studies have shown that gamification has demonstrated more favorable outcomes, the research questions need to be more detailed and specific to a single element rather than a broad picture. Kocadere & Çağlar (2017) for their study wanted to keep the research simple by not researching the traits that gamer-types rarely experience but will proceed as an adaptability and survival mechanism within the environment.

Using games or game mechanics in non-game scenarios often criticizes those looking at gamification and making assumptions. At first glance, that assumption can be accurate. However, if goals and outcomes can be learned using game mechanics, it will surprise you that a game surrounds society. McDougall (2018) describes learning outcomes such as new practices, collaboration, hypothesis solutions, strategy implementation, and mastery. However, Rapp et al. (2019) discuss game-design theories being broken down into simple questions so much that it slows the progression of knowledge obtained. Part of the mastery aspect is deep-rooted in motivation, and gamification has shown to increase that when properly implemented (Hassan et al., 2021). Rapp et al. (2019) advise that more complex questions and solutions be explored.

As researchers explore these concepts, there needs to be more in-depth research of these complex issues and the consequences of poor game design. Consistently, much of the literature identified these failed designs hindered the legitimacy of gamification. Unfortunately, the redundancy of the questions being asked and explored has slowed the growth significantly and mainly focused on human-technology interaction (Landers, 2017).

# References

Buckley, P., & Doyle, E. (2017). Individualizing gamification: An investigation of the impact of learning styles and personality traits on the efficacy of gamification using a prediction market. *Computers and Education*, 106, 43-55. https://doi.org/10.1016/j.compedu.2016.11.009

Hamari, J. (2017). Do badges increase user activity? A field experiment on the effects of gamification. *Computers in Human Behavior*, 71, 469-478. https://doi.org/10.1016/j.chb.2015.03.036

Hassan, M. A., Habiba, U., Majeed, F., & Shoaib, M. (2021). Adaptive gamification in e-learning based on students' learning styles. *Interactive Learning Environments*, 29(4), 545-565. https://doi.org/10.1080/10494820.2019.1588745

Kocadere, S. A., & Caglar, S. (2018). Gamification from player type perspective: A case study. *Educational Technology & Society*, 21(3), 12-22.

Landers, R. N. (2019). Gamification misunderstood: How badly executed and rhetorical gamification obscures its transformative potential. *Journal of Management Inquiry*, 28(2), 137–140. https://doi-org/10.1177/1056492618790913

McDougall, A. (2018). When I say … gamification. *Medical Education*, 52(5), 469-470. https://doi.org/10.1111/medu.13481

Mullins, J. K., & Sabherwal, R. (2020). Gamification: A cognitive-emotional view. *Journal of Business Research*, 106, 304-314. https://doi.org/10.1016/j.jbusres.2018.09.023

Nacke, L. E., & Deterding, S. (2017). The maturing of gamification research. *Computers in Human Behavior*, 71, 450-454. https://doi.org/10.1016/j.chb.2016.11.062

Rapp, A., Hopfgartner, F., Hamari, J., Linehan, C., & Cena, F. (2019). Strengthening gamification studies: Current trends and future opportunities of gamification research. *International Journal of Human-Computer Studies*, 127, 1-6. https://doi.org/10.1016/j.ijhcs.2018.11.007

Rodrigues, M., Isotani, S., & Zarate, L. (2018, May). Educational data mining: A review of evaluation process in the e-learning. *Elsevier: Telematics and Informatics*. https://doi.org/10.1016/j.tele.2018.04.015

Sailer, M., & Lisa, H. (2020). The gamification of learning: A meta-analysis. *Educational Psychology Review*, 32(1), 77-112. <http://dx.doi.org.ezproxy.liberty.edu/10.1007/s10648-019-09498-w>

Vesa, M., & Harviainen, J. T. (2019). Gamification: Concepts, consequences, and critiques. *Journal of Management Inquiry*, 28(2), 128–130. https://doi.org/10.1177/1056492618790911