



Defining gamification: a systematic literature review for developing a process-oriented definition

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Abstract

Gamification has gained popularity as a technique to enhance engagement, motivation, and learning in non-gaming contexts. However, a clear and practical definition of gamification is essential for its successful application. This paper presents a systematic literature review of various definitions of gamification provided by researchers to derive a process-oriented definition. Here, the systematic literature review encompassed a comprehensive investigation of the available scholarly literature. The initial search yielded 10,100 publications. Subsequently, an exclusion process was employed to refine the dataset, resulting in the analysis of a final set of 22 papers selected for their relevance. The goal of the review is to help educators design gamification-based courses easily and effectively. By examining the various definitions of gamification, this study identifies the essential characteristics of gamification as a process that makes activities more game-like. The resulting process-oriented definition of gamification helps to build relevant theories and models for learning and design/training courses based on gamification. This paper contributes to the growth of gamification as a field by creating a better fit between academic and practitioner perspectives.

Keywords: Gamification, Definitions, Process-oriented, Education, Gamified-Content

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Introduction

Gamification is the art of applying game-like elements and principles to non-gaming contexts. In recent years it has found applications across wide range of industries, including education, employee training, customer engagement, healthcare, finance, marketing, advertising, and personal productivity (Dicheva et al., 2015). The concept of gamification dates to the 1970s, but it became widely recognized in the early 2000s with the rise of digital technology and the internet (Kapp, 2012). The advent of smartphones further supported gamification into the mainstream. These devices brought gamified experiences directly into the palms of millions (Deterding et al., 2011). Day by day the digital innovation has particularly enhanced its use in education. It has created interactive and engaging learning experiences to the students. The COVID-19 pandemic further boosted the adoption of gamification (Nieto-Escamez & Roldán-Tapia, 2021) and it has particularly increased in education with digital innovation (Morschheuser et al., 2017), (Seaborn & Fels, 2015). Accordingly, it shows that gamification primarily helps to enhance user engagement. It also improves motivation, attention, and performance. To achieve benefits in gamification, it needs to integrate interactive game elements, which rewards and challenges to enhance learners' interaction and retention (Alexiou & Schippers, 2018) Given its potential, gamification provides a safe space for learners to practice and apply knowledge, making it increasingly valued in competency-based education. (Bourgon, 2012).

This study is mainly focused on how gamification develops learning experience by including game mechanics, learning mechanics to achieve relevant game goals in teaching environment. There are different definitions for gamification defined in each field based on the usage of it. The currently available definitions are not fully captured all the essential elements necessary to understand its application in different contexts (Mora et al., 2015). Still, the universal definition for applying gamification to the non-gaming context has not been identified yet. Further, as Deterding has disclosed, there is no universal list of game elements [Deterding, 2012]. For example, if, according to Koster, "Narrative in a game is not a mechanic. It's a form of a feedback" (Koster, 2012), Although this question may seem simple, answering it is not as simple as it is to other games, according to design theorists, applying narrative to business processes constitutes gamification.

And the lack of a formal definition for gamification has caused challenges in its application (Deterding et al., 2011), (Mora et al., 2015). Therefore, existing solutions often lack a clear design process and rely on random game components (Mora et al., 2015). Therefore, this inherent uncertainty is a problem, and a clear definition of gamification is necessary for effectively integrating it into the design process. Without a clearly defined definition suitable for different contexts, it is challenging to apply gamification and measure its impact accurately. As gamification evolves, a process-oriented definition is necessary to understand its boundaries and promote its growth (Werbach, 2014). Therefore, this research aims to derive a process-oriented definition for gamification by analysing a broad literature facilitating the effective design of gamification-based courses for educators.

Review Methodology

The literature searches were conducted in the Google Scholar database, which was chosen because it indexes all other potentially relevant databases, such as ACM, IEEE, JSTOR, Science Direct, Springer, Wiley Online Library, etc. Employing only one extensive database instead of performing searches in various repositories was preferred to increase the severity and clarity of the data gathering. Therefore, the search for literature in the database was conducted using the search under the title: "Gamification in Education," The investigation was conducted from 12/2022 to 02/2023 and resulted in 10,100 publications. The search included conference papers, journal articles, systematic review papers, and book chapters within a restricted the period from 2011 to 2022. Further, Search strings have been specified according to the below categories.

- With the **exact phrase**: "Gamification in Education"
- With **at least one** of the words: Definition OR Design OR Gamified OR Redefine
- Where my words occur: Anywhere in the article.
- Articles **dated** between 2011-2022

The systematic review seeks to collect all the available evidence according to previously specified eligibility criteria to respond the research questions; for this purpose, a systematic method was utilized that provides more reliable results to establish conclusions and, consequently, decision accomplishing (Thoemmes & Kim, 2011).

Inclusion/exclusion criteria were determined for selecting the documents for the systematic review.

- a) Regarding the language, only studies that were in English were accepted. Studies in other languages were excluded.
- b) Only articles from specialized scientific journals were considered acceptable in terms of the format. Those published on nonspecialized websites, blogs, digital newspapers, books, book chapters, doctoral theses, and the like were excluded.
- c) The intervention was targeted primarily toward students and/or teachers in formal education settings, so only studies focused on this group were accepted. Studies targeting individuals in nonformal education contexts, such as socio-community intervention programs and educational programs for public health, were not considered eligible.
- d) Only papers that are freely accessible were included.
- e) The study topic focused on educational gamification, so only studies using this approach were eligible, and papers not relevant to the domain were excluded.
- f) To adequately address the research questions asked, experimental studies that did not specify their sample and resources used were also excluded.
- g) Duplicate papers were removed, and those that did not mention gamification definitions after a thorough review were also excluded. Based on the defined parameters, selected research papers were exported to a specific folder in the Zotero software, which automatically compared and identified duplicates by sorting papers on titles. This could be done by comparing each paper's title, authors, and publication details.

This process is summarized and depicted in Figure 1, and this systematic literature review adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al, 2010).

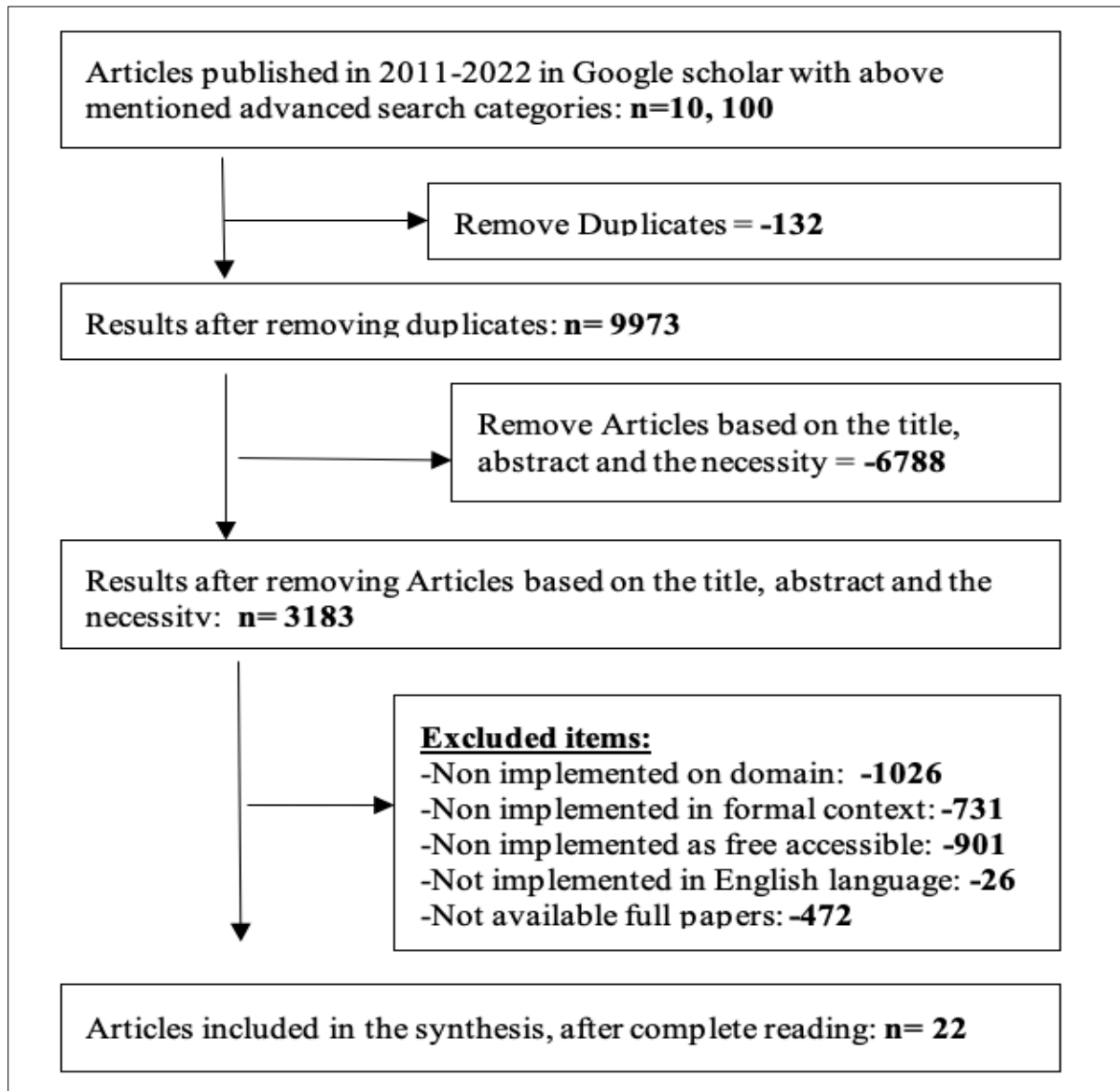


Figure 1: The flow of search and selection of analyzed sources.

Data Analysis and Results

The section data analysis and results are structured in accordance with the research question defined in the introduction phase. In the first search on Google Scholar, 10,100 publications were taken, and 22 of them were filtered and analyzed in this phase to target the definitions of gamification. Here, most of the papers have been selected according to the Education domain and excluded non-relevant papers as defined in the exclusion criteria in the methodology. The results from the analysis of 22 papers have been filtered according to specified criteria (Figure 1) and displayed the various definitions of gamification. A table below (Table 1) was constructed in which the results were sorted. The various definitions of gamification relevant to the educational domain are displayed in Table 1.

Table 1: Definitions of gamification

ID	Year	Title of the paper	Definition	Database
1	2011	Gamification. using game-design elements in non-gaming contexts.	Gamification is “the use of game design elements in nongame contexts” (Deterding, Sicart, et al., 2011)	Google Scholar
2	2011	Gamification by design: Implementing game mechanics in web and mobile apps	Gamification is “the process of game-thinking and game mechanics to engage users and solve problems” (Sucherman & Cunningham, 2011)	Google Scholar
3	2011	How to do things with videogames	gamification is “bullshit” and “exploitation ware” (Kruis et al., 2014)	Google Scholar
4	2011	Raising engagement in e-learning through gamification	Gamification claims that the “use of game elements in the classroom enhances learning by increasing engagement and motivation and facilitating social learning” (Muntean, 2011)	Google Scholar
5	2011	From game design elements to gamefulness: defining" gamification"	Gamification is defined as “employing game design elements in a non-gaming context” (Deterding et al., 2011)	Research Gate
6	2012	eLearning Resources from EFront Blog.	Gamification is “adapting an experience such as purchasing bread, mastering a handwriting recognition program, or learning math with game-like elements” (Gogos,2016)	Google Scholar
7	2012	Gamification: designing for motivation	Gamification, “which has been considerable, though inconsistently, referred to as the selective incorporation of game elements into an interactive system without a fully-fledged game as the end product” (Deterding,2012)	Association for Computing Machinery (ACM)
8	2012	Defining gamification: a service marketing perspective	Gamification refers to “enhancing a service with affordances for gameful experiences to support users' overall value creation” (Huotari & Hamari, 2012)	Google Scholar

9	2012	A gamified mobile application for engaging new students at university orientation	Gamification is “increasingly interested in using game features in nongame applications to increase engagement and motivation” (Fitz-Walter et al., 2012)	Google Scholar
10	2012	The gamification of learning and instruction: game-based methods and strategies for training and education	Gamification allows “students to receive instant feedback about their progress in the classroom and acknowledgment of an accomplished the task” (Kapp,2012)	Google Scholar
11	2013	What Does “Gamification” Mean?	Gamification is the “process of using gaming methods and mechanics in a non-gaming environment to motivate customers and employees” (Utendorf,2013)	Google Scholar
12	2013	Gamification of Education using Computer Games.	Gamification refers to the “application of game design elements to nongame activities and has been applied to various contexts, including education” (Nah et al., 2013)	Research Gate
13	2013	The gamification of learning and instruction field book: Ideas into practice.	Gamification is using “game-based mechanics, aesthetics, and game thinking to engage people, motivation action, promote learning, and solve problems” (Kapp,2013)	Wiley
14	2013	A Preliminary Taxonomy of Gamification Elements for Varying Anticipated Commitment	“Introduction of game elements in the design of learning processes” (Robinson, 2013)	Association for Computing Machinery (ACM)
15	2014	Hype Cycle for Emerging Technologies maps the journey to digital business.	Gamification “uses game mechanics and experience design to engage and motivate people to achieve their goals digitally” (Gartner, J., 2014)	Google Scholar
16	2014	Does Gamification Work?- A Literature Review of Empirical Studies on Gamification	Gamification has been defined as a “process of enhancing services with (motivational) affordances to invoke gameful experiences and further behavioral outcomes” (Hamari et al., 2014)	Institute of Electrical and Electronics Engineers (IEEE)

17	2014	Developing a theory of gamified learning: Linking serious games and gamification of learning.	Gamification is the “usage of game attributes, as described by the Bedwell taxonomy, outside the context of a game with the purpose of affecting learning-related behaviors or attitudes. These behaviors/attitudes, in turn, influence learning by one or two processes” (Landers, 2014)	Sage Publications
18	2014	(Re)Defining Gamification: A Process Approach	The process of “making activities more game-like” focuses on the crucial space between the components that make up games and the holistic experience of gratefulness” (Werbach,2014)	Springer
19	2016	Correcting misconceptions about gamification of assessment: More than SJTs and badges	“Adding game elements is an incremental and versatile process, ranging from the simple addition of one aspect to the addition of a complex set of elements” (Armstrong et al., 2016)	Cambridge journal
20	2017	Gamification	Gamification, which applies “game-related elements to non-game contexts, has generated high interest and is popular in many business domains” (Basten, 2017)	Institute of Electrical and Electronics Engineers (IEEE)
21	2018	On the architecture of game science	Gamification is “a business practice and a management method. It does not aim at doing real-time business procedures, a playful game” (Klabbers, 2018b)	SAGE Publications
22	2018	Games and simulations in industrial engineering education: a review of the cognitive and affective learning outcomes	Gamification is considered “a broad umbrella concept encompassing superficial Gamification, deeper Gamification, and game-based learning, with a particular focus on gaming for educational purposes” (Despeisse,2018)	Institute of Electrical and Electronics Engineers (IEEE)

The selected papers (22 papers) emphasized the importance of keyword extraction because it greatly helps in enhancing the definition of gamification. The Voyant Tool (Welsh,2014) was used in the analysis section for word frequency analysis. Voyant Tool, an open-source software, generated results based on the data provided. As per the data imported into Voyant, the identification and display of the most frequently used words were accomplished and illustrated in Figure 2.

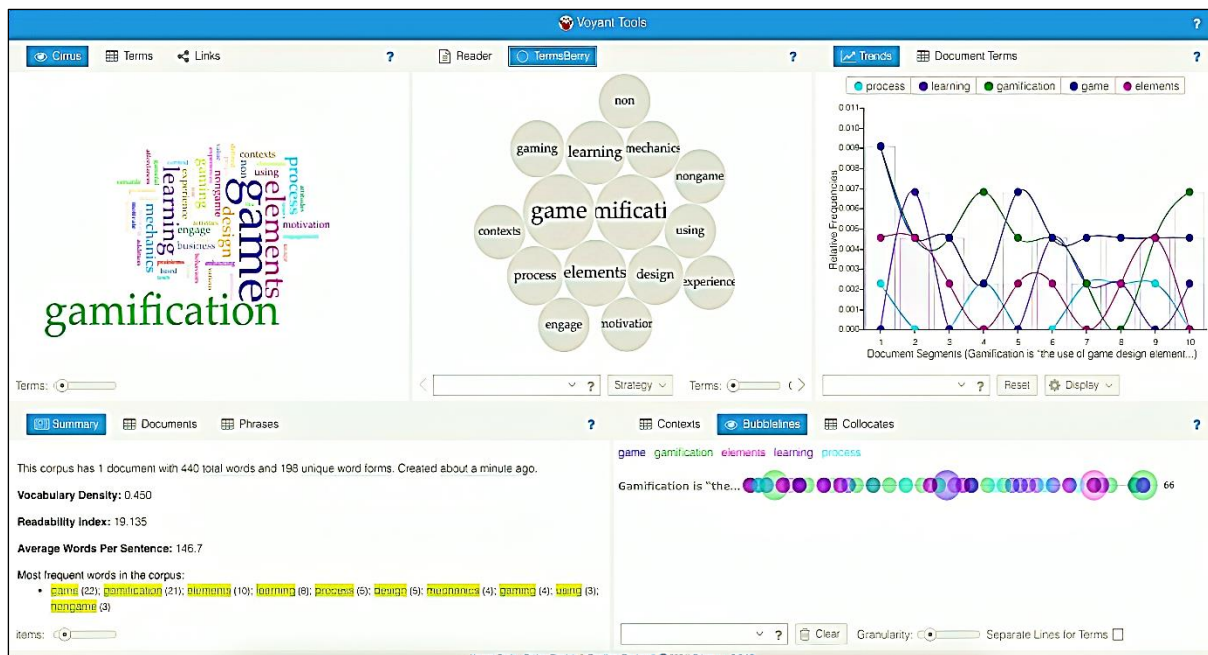


Figure 2: Most frequently used words in the various gamification definitions

According to the results from Voyant Tool, it has identified and graphically represented the words such as “Game,” “Elements,” “Learning,” “Mechanics,” “Process,” “Design,” and “Gaming” are words which usually occur in a gamification definition in the learning domain. The keywords extracted are automatically suggested by the Voyant tool, and the occurrences of each keyword are displayed in Table 2.

Table 2: Extracted keywords with occurrences

Keyword	Occurrences in definitions
game	22
gamification	21
elements	10
learning	08
process	05
mechanics	05
design	05
gaming	04

The connection between the keywords of gamification in learning, which were extracted from the tool, should be identified to define gamification clearly. It is meant that the definitions of gamification in learning should comprise all the keywords extracted. Further, the word "process" is emphasized, meaning that the definition of gamification should be oriented toward the process. The connection of all the extracted keywords can be generated by creating a model or theory to use in an educational context to help educators effectively design gamification-based courses. An individual keyword is not considered to have a proper definition without identifying the clear connections. Therefore, the relationship between these keywords has been identified to verify and strengthen the relationship between the keywords.

Results: Derived Definition for Gamification

The Figure 3 shows the proposed definition of gamification graphically according to the extracted keywords in Figure 2 (*Most frequently used words in the various gamification definitions*) and the key studies reviewed to derive the definition of gamification.

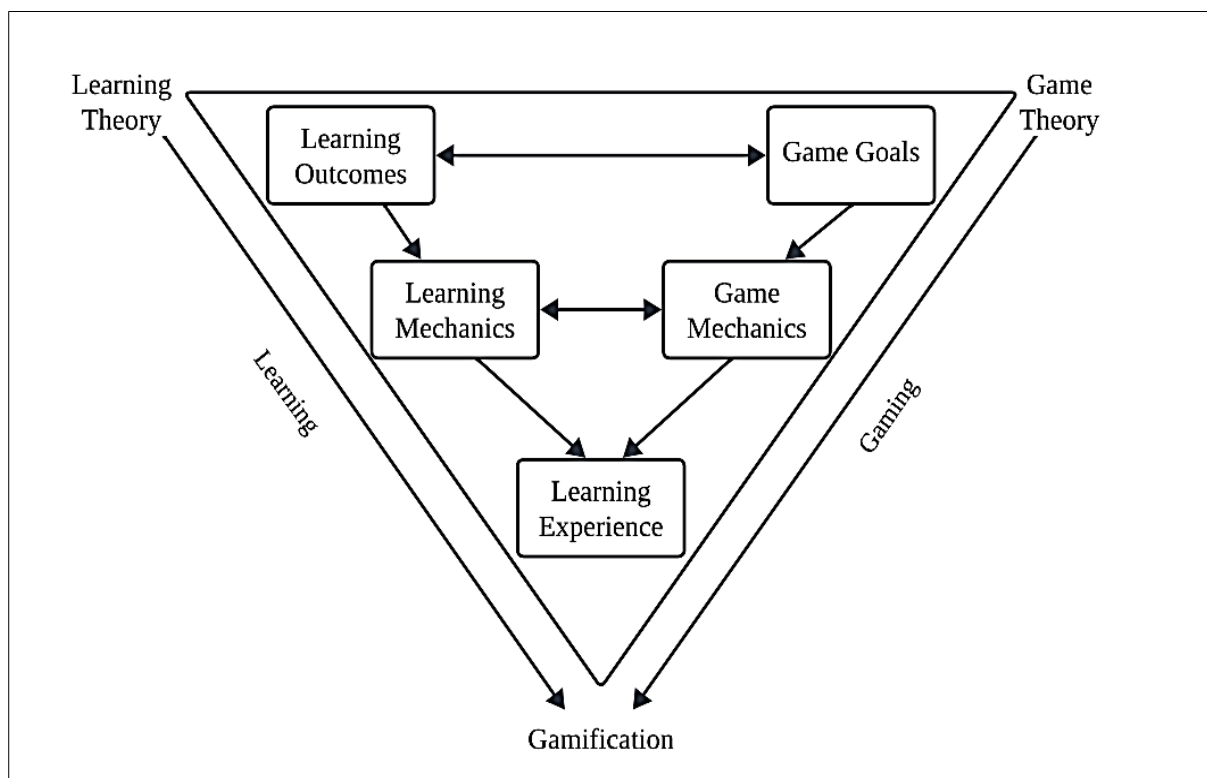


Figure 3: Derived definition of gamification.

Derived Definition: *Gamification is a purposeful collection of Learning Mechanics and Game Mechanics to provide a better Learning Experience for a learner to achieve the Intended Learning Outcomes (ILOs) through Game Goals effectively.*

As per the gamified content creation process, the utilization of the definition should encompass the interconnections between each part. And this is a process-based definition of Gamification based on the theory explained in 4.1.

The overview of the key studies reviewed to derive the definition of gamification.

To establish a precise definition based on the keywords identified in Table 02, it is imperative to ascertain the interrelationships among the underlying concepts. Within the context of gamified content creation as a procedural activity, the definition should comprehensively capture the following categories. This provides an overview of the major studies that were reviewed to determine the interconnections necessary to derive a comprehensive definition of gamification.

i. Define Learning Theory

Learning theory explores how students receive, process, and retain knowledge, with cognitive, emotional, and environmental factors, and prior experiences impacting learning outcomes (McDevitt et al, 2012). However, there are many different learning theories available. But, these theories aren't mutually exclusive; educators and researchers combine them for a comprehensive understanding, leading to better retention, skills, and real-world performance.

ii. Define Game Theory

Game theory examines strategic interactions among individuals or groups, where outcomes depend on the choices made by all players (Dixit, 2008). It models rational behavior in situations where outcomes are influenced by others' actions. In games, each player has possible actions leading to specific outcomes, and they aim to maximize their payoff or utility based on beliefs about others' strategies and payoffs. To create engaging learning environments, game-theoretic concepts like Iterated Prisoner's Dilemma and Nash equilibrium are used (Nowak, 2006; Nash, 1950). Game theory aids in designing learning environments that align with how individuals learn and make decisions strategically.

iii. Identify the relationship between learning theory and game theory.

Both learning theory and game theory focus on human behavior and decision-making in learning environments. Learning theory explains how individuals learn from experience and how consequences shape behavior, while game theory explores decision-making in competitive situations. Learning theory emphasizes factors like reinforcement, cognitive processes, and social interactions in shaping learning outcomes, whereas game theory, a branch of mathematics and economics, deals with strategic decision-making.

Game theory can be applied in learning environments to analyze incentives and rewards that motivate learners and their strategies for achieving learning goals. Both theories are crucial for designing gamified content in learning environments. Learning theory explains how individuals acquire skills for strategic decision-making in game theory scenarios, while game theory provides a controlled environment to observe and measure how individuals learn and adapt to different decision-making situations. Integrating game theory into learning theory can enhance the learning experience.

iv. Define Intended Learning Outcomes (ILOs)

Intended learning outcomes (ILOs) specify the knowledge, skills, and attitudes learners are expected to acquire from a particular learning experience. They articulate what learners should know, understand, and demonstrate after completing the learning process. Different taxonomies, such as Bloom's Taxonomy, Anderson and Krathwohl's Taxonomy, and Solo Taxonomy, help organize and categorize learning outcomes. The ILOs play a crucial role in aligning course components like learning activities, assessments, and instructional materials with learning objectives.

v. Define Game Goals

Game goals represent the objectives or targets players must achieve to win a game, providing a clear sense of purpose and direction during gameplay (Salen & Zimmerman, 2003). They can vary depending on the game type, rules, and intended outcome, and are designed to challenge players, motivating them to improve their skills and strategies.

In a gamified learning environment, game goals play a crucial role in engaging and motivating students. They provide a clear objective for learning, allowing students to track their progress and feel a sense of accomplishment upon achievement.

vi. Define Game mechanics

Game mechanics are the rules, systems, and interactions that govern how a game operates (Koster & Wright, 2004). They define player actions, interactions with the game world, and the outcomes of decisions. Game mechanics are essential in game design, providing structure and making the game enjoyable. Examples of game mechanics include point systems, levels, quests, achievements, badges, and leaderboards (Chang, 2016).

When learning becomes unengaging or boring, it can lead to poor learning outcomes, especially for learners who require more motivation or interest in the subject matter (Lectures Aren't Just Boring, They're Ineffective, Too, Study Finds, 2014). To address this, educators can incorporate game elements into the learning environment to create a more engaging and motivating experience that encourages active participation and learning.

vii. Define Learning mechanics

Learning mechanics are the rules, systems, and interactions that facilitate and support the process of learning within a game or educational experience. These mechanics are designed to help players acquire new knowledge, skills, or understanding in an engaging and effective way (Reigeluth, 2013). It involves the study of the mechanisms and techniques used to enhance the learning process, including cognitive, behavioral, and emotional factors that impact learning. By incorporating fundamental learning mechanics into the design of the gamified learning environment, designers can create a more prosperous and effective learning experience for learners. Effective learning mechanics can help make the learning experience more engaging and enjoyable, while also facilitating deeper and more meaningful learning.

viii. Define Learning Experience

Learning experiences are activities designed to facilitate the acquisition of knowledge, skills, or understanding in a specific subject or domain. They can be formal classroom instruction, online courses, workshops, simulations, apprenticeships, or gamified learning experiences. Effective learning experiences should engage learners and promote active, experiential learning, allowing learners to apply new knowledge in real-world contexts and providing feedback and reflection opportunities. Combining simulations with gamified learning can be a powerful approach to create engaging and effective learning experiences. Simulations offer a safe environment for learners to practice real-world skills, while gamification increases motivation and engagement. The combination of simulations and gamification can enhance the learning experience.

ix. Identify the relationship between ILOs and Learning Mechanics

The relationship between Intended Learning Outcomes (ILOs) and Learning Mechanics is interdependent and closely related. Learning Mechanics are the strategies and techniques used to help learners achieve the knowledge, skills, and attitudes described in the ILOs. The alignment of ILOs and Learning Mechanics is crucial in creating effective learning experiences.

ILOs provide the overarching learning goals and objectives, while Learning Mechanics deliver the methods and techniques to achieve these goals. By carefully selecting and designing Learning Mechanics that support the ILOs, educators and designers can create effective learning experiences that enable learners to achieve the desired outcomes.

x. Identify the relationship between Learning Mechanics and Learning Experience

The relationship between Learning Mechanics and Learning Experience is closely related. Learning Mechanics are the tools, strategies, and techniques used to create and facilitate the Learning Experience. They enable learners to engage with the content actively and participate in the learning process. Effective Learning Mechanics contribute to a positive Learning Experience by creating engaging and interactive learning opportunities that stimulate curiosity and foster motivation to learn. Conversely, the Learning Experience informs the selection and design of Learning Mechanics. Understanding learners' needs, interests, and preferences helps educators and designers select and design relevant, meaningful, and effective Learning Mechanics, creating a positive learning experience for learners. The goal is to create a learning experience that encourages learners to engage, participate, and take on challenges, leading to successful achievement of their learning goals.

Learning mechanics encompass elements such as feedback, rewards, challenges, goals, and interactions that contribute to the overall learning experience. The design of learning mechanics should align with learning objectives and desired outcomes, ensuring they engage and motivate learners effectively. Overall, the relationship between learning mechanics and learning

experiences involves mutual support and interdependence, requiring careful consideration and design to create effective learning experiences.

xi. Identify the relationship between Game Goals and Game Mechanics

The relationship between game goals and game mechanics is that the game mechanics are designed to support the game goals. The game mechanics provide the tools and systems players can use to achieve the game's goals. For example, if the game goal is to complete a puzzle, the game mechanics may allow the player to move objects around the screen, rotate them, or change their size. Considering the connection between game goals and game mechanics, Game mechanics provide players with the tools, systems, and rules necessary to achieve the game goals. And Game mechanics create challenges and obstacles players must overcome to achieve game goals.

xii. Identify the relationship between Learning Mechanics and Game Mechanics

The connection between learning and game mechanics lies in using game mechanics to enhance learning experiences. By incorporating game mechanics into learning experiences, educators can create engaging and motivating experiences that promote learning and retention of information. This approach is often referred to as gamification, and it involves using game-like elements to make education more enjoyable and effective. Learning and game mechanics can work together to create engaging and effective learning environments that help learners acquire knowledge and skills more effectively. For example, learning mechanics such as active learning can be combined with game mechanics to create interactive and engaging learning experiences. Accordingly, by combining learning mechanics and game mechanics, educators can create learning environments that are engaging, motivating, and effective. These environments can help learners acquire knowledge and skills more effectively and be more enjoyable and rewarding for learners.

Overall, the relationship between learning mechanics and game mechanics is one of overlap and shared principles, with game mechanics often providing inspiration for the design of learning mechanics. However, the primary goal of learning mechanics is to support the acquisition of knowledge and skills, while the primary goal of game mechanics is to create engaging and entertaining gameplay experiences.

The process of applying gamification for education based on the definition provided above is shown in Figure 4.

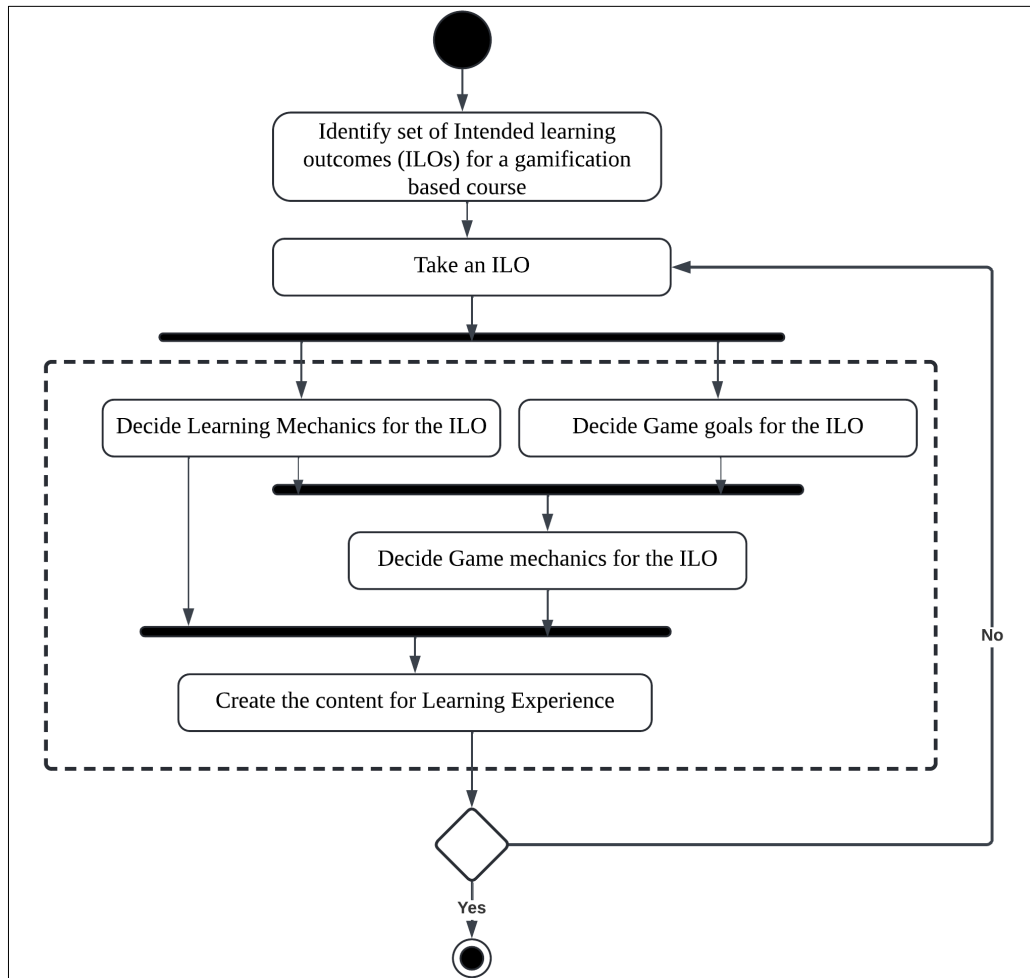


Figure 4: Process of Gamified Content Creation

Let's apply the process shown in Figure 04 to the main scenario of resigning of a key team member from the team during an ongoing project, where he/she has assigned tasks.

Step 01: Identify set of ILOs for a gamification-based course

When creating gamification content to teach in an educational setting, it is necessary to first consider the intended learning outcomes (ILOs). Based on the primary scenario of a key team member's resignation align with Project Management subject, eight (08) ILOs have been identified as follows.

After completing this unit, Learner should be able to:

ILO 01: understand the importance of adaptability and flexibility in team management.

ILO 02: identify the key factors influencing talent retention within organizations and implement effective strategies to address them.

ILO 03: develop and implement a robust succession plan to mitigate the impact of key staff departures, ensuring continuity in project execution and minimizing troubles caused by turnover.

ILO 04: preserve institutional knowledge and prevent information gap within teams using strategies.

ILO 05: improve how they describe jobs, make hiring processes softer, and find the right people more easily after a key team member leaves.

ILO 06: implement strategies to boost team morale and restore a positive work environment.

ILO 07: implement continuous improvement initiatives aimed at optimizing project workflows and enhancing team effectiveness.

ILO 08: implement strategies to minimize the impact of personnel departures on overall project timelines.

Step 02: Take an ILO

Considering the first ILO, after completing this unit, Learner should be able to: understand the importance of adaptability and flexibility in team management when resigning key team member from the team during ongoing project.

Step 03: Decide learning Mechanics for the ILO

Scenario-based learning: Present the players with a real-world scenario where a key member of the team resigns. Players will need to make decisions on how to adapt to overcome challenges.

Role-playing: Divide players into teams and assign roles, including the team lead and resigning team member. Players act out the scenario, practicing communication and adaptation.

Simulations: Use virtual team exercises to test adaptability strategies in changing circumstances.

Step 04: Decide Game Goals for the ILO

Maintain team productivity: The goal is to keep the team functioning smoothly despite the loss of a key member. Players should focus on assigning tasks, upskilling existing team members, and finding new member with talent.

Meet project deadlines: Despite the setback, the team should try to complete projects on time. This goal highlights the importance of adjusting timelines and workflows.

Step 05: Decide Game mechanics for the ILO

Points system/feedback and Levels: Award points and feedback for making decisions that demonstrate adaptability and flexibility. Points can be deducted for missed opportunities or rigid approaches or else Pause the game to restrict the user from advancing to the next level or questions.

Time pressure: Introduce time limits for decision-making to simulate real-world situations where quick adaptation is necessary.

Step 06: Create the content for Learning Experience

Figure 05 depicts the game created, which takes into learning mechanics, including scenario-based learning, simulations, and role-playing. Additionally, it aligns with the game goals of maintaining team productivity and meeting project deadlines, integrating game elements such as points, feedback, time constraints, and levels.

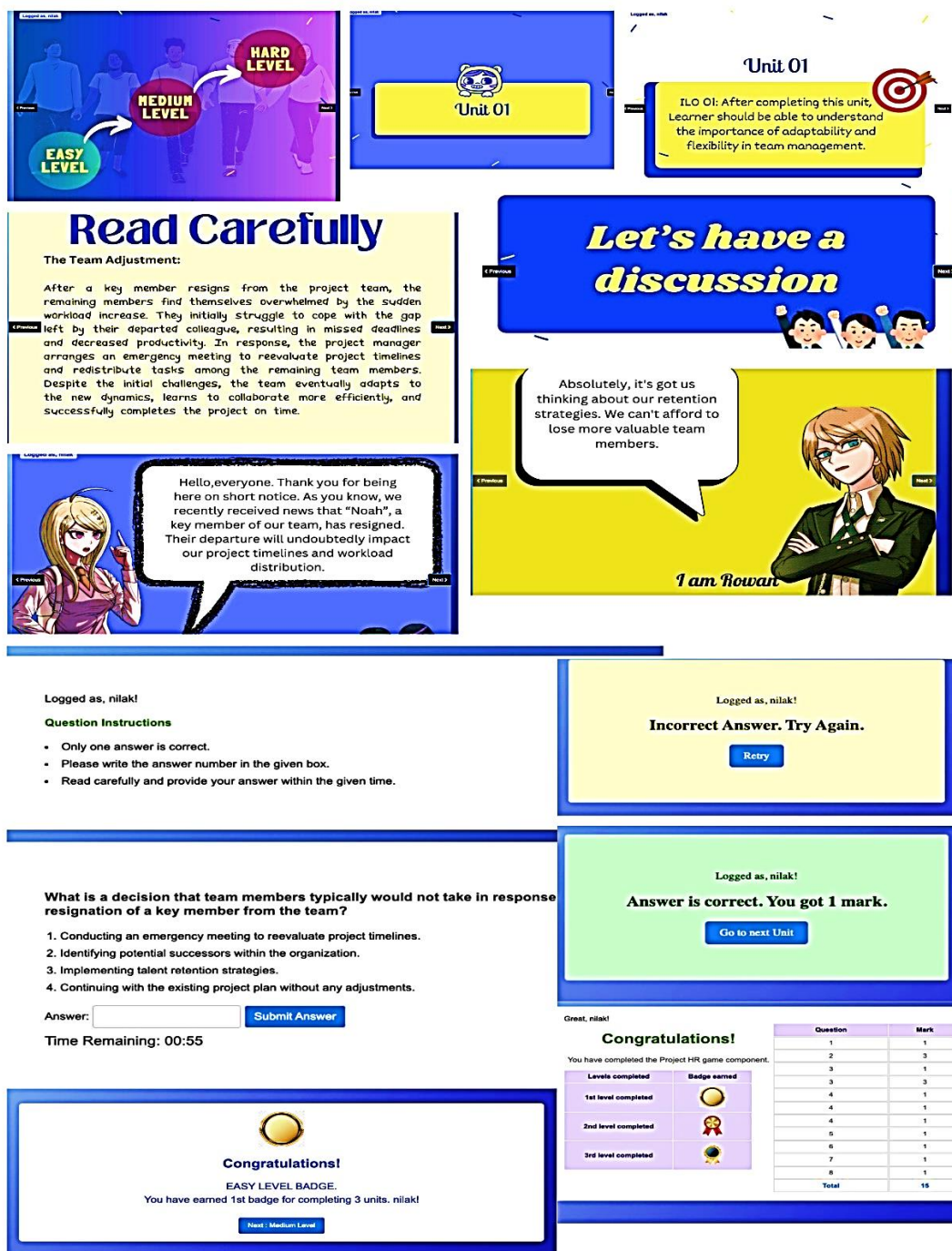


Figure 5: Interfaces to created game based on the process in Figure 4

Discussion

This study presents an initial process-oriented definition of gamification focused on improving the design of the courses in the field of education. Regarding this approach, the existing definitions and methodologies of gamification have been synthesized to pay more attention to the systematic approach to applying game elements in educational settings. The derived definition of gamification as the act of deliberately incorporating the Learning Mechanics and the Game Mechanics for the purpose of developing interesting learning material which will assist the learners in attaining their intended learning objectives efficiently. This definition is quite helpful especially when it comes to defining the procedure and processes involved in gamification in learning and skill acquisition. In contrast, the definitions in Table 1 describes gamification as using elements of game design in non-gaming contexts. This broader definition emphasizes how game-like features can enhance engagement and motivation in various non-game settings, beyond just educational contexts. It is a broad concept rather than the derived definition of this paper. This comparison clarifies how each definition can be applied practically, with the first derived definition specifically guiding the creation of gamified educational content to enhance learning outcomes.

Conclusion

In conclusion, this research provides an in-depth review of the literature on gamification to identify various definitions provided by researchers. The systematic literature review shows that the term “gamification” is used inconsistently and lacks a standardized definition. The lack of a clear definition makes it challenging for educators to integrate gamification effectively into their course designs.

Therefore, this study has proposed a process-oriented definition for gamification, which can aid educators in designing gamification-based courses easily and effectively. The proposed definition is based on a comprehensive analysis of existing definitions and focuses on the process of applying game elements and mechanics to non-game contexts. The proposed definition suggests that gamification should be viewed as a process that involves identifying learning objectives, selecting appropriate game mechanics, and designing game-based activities that motivate learners to achieve these objectives. Educators can develop a more structured and systematic approach to gamification by adopting this process-oriented definition, enhancing learners' engagement and motivation. Overall, this study contributes to the literature on gamification by providing a comprehensive and systematic review of existing definitions and proposing a process-oriented definition that can facilitate the integration of gamification into educational contexts. Further research can explore the effectiveness of this definition in designing gamification-based courses and evaluating the impact of gamification on learners' engagement and motivation.

References

- Alexiou, A., & Schippers, M. C. (2018). Digital game elements, user experience and learning: A conceptual framework. *Education and Information Technologies*, 23(6), 2545–2567.
<https://doi.org/10.1007/s10639-018-9730-6>

- Armstrong, M. B., Ferrell, J. Z., Collmus, A. B., & Landers, R. N. (2016). Correcting misconceptions about gamification of assessment: More than SJTs and badges. *Industrial and Organizational Psychology*, 9(3), 671–677. <https://doi.org/10.1017/iop.2016.69>
- Basten, D. (2017). Gamification. *IEEE Software*, 34(5), 76–81. <https://doi.org/10.1109/ms.2017.3571581>
- Bourgon, G., Gutierrez, L. and Ashton, J. (2012) 'The evolution of community supervision practice: The transformation from case manager to change agent. *Fed. Probation*, 76, p.27.
- Chang, J. W., & Wei, H. Y. (2016). Exploring engaging gamification mechanics in massive online open courses. *Journal of Educational Technology & Society*, 19(2), 177-203.
- Despeisse, M. (2018). GAMES AND SIMULATIONS IN INDUSTRIAL ENGINEERING EDUCATION: A REVIEW OF THE COGNITIVE AND AFFECTIVE LEARNING OUTCOMES. 2018 Winter Simulation Conference (WSC). <https://doi.org/10.1109/wsc.2018.8632285>
- Deterding, S. (2012). Gamification. *Interactions*, 19(4), 14–17. <https://doi.org/10.1145/2212877.2212883>
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness. <https://dl.acm.org/doi/proceedings/10.1145/2181037>. <https://doi.org/10.1145/2181037.2181040>
- Deterding, S., Sicart, M., Nacke, L., O'Hara, K., & Dixon, D. (2011). Gamification. using game-design elements in non-gaming contexts. CHI EA '11: CHI '11 Extended Abstracts on Human Factors in Computing Systems. <https://doi.org/10.1145/1979742.1979575>
- Dicheva, D., Dichev, C., Agre, G., & Angelova, G. (2015). Gamification in Education: A Systematic Mapping study. *Educational Technology & Society/Journal of Educational Technology & Society*, 18(3), 75–88. http://www.ifets.info/journals/18_3/6.pdf
- Dixit, A.K. and Nalebuff, B., (2008). *The art of strategy: a game theorist's guide to success in business & life*. WW Norton & Company.
- Fitz-Walter, Z., Tjondronegoro, D., & Wyeth, P. (2012). A gamified mobile application for engaging new students at university orientation. OzCHI '12: Proceedings of the 24th Australian Computer-Human Interaction Conference. <https://doi.org/10.1145/2414536.2414560>
- Gartner, J. (2014) Gartner's 2014 hype cycle for emerging technologies maps the journey to digital business. GARTNER, Inc.[online], 11.
- Gogos, R. (2016, May 9). Gamification and eLearning - eFront blog. eFront Blog. <https://www.efrontlearning.com/blog/2013/09/gamification-and-elearning.html>
- Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does Gamification Work? -- A Literature Review of Empirical Studies on Gamification. 2014 47th Hawaii International Conference on System Sciences. <https://doi.org/10.1109/hicss.2014.377>
- Huotari, K., & Hamari, J. (2012). Defining gamification. MindTrek '12: Proceeding of the 16th International Academic MindTrek Conference. <https://doi.org/10.1145/2393132.2393137>
- Kapp, K. M. (2012). *The Gamification of Learning and instruction: Game-based Methods and Strategies for Training and education*. <https://dl.acm.org/citation.cfm?id=2378737>
- Kapp, K. M. (2013). *The Gamification of Learning and Instruction Fieldbook: Ideas into Practice*. <http://ci.nii.ac.jp/ncid/BB14511574>
- Klabbers, J. H. (2018b). On the Architecture of Game Science. *Simulation & Gaming*, 49(3), 207–245. <https://doi.org/10.1177/1046878118762534>

- Koster, R. (2012, January 24). Narrative is not a game mechanic. Raph's Website.
<https://www.raphkoster.com/2012/01/20/narrative-is-not-a-game-mechanic/>
- Koster, R., & Wright, W. (2004). A theory of fun for game design.
<http://ci.nii.ac.jp/ncid/BB15618405>
- Kruis, N., Lehman, C., & Rowland, N. J. (2014). How to Do Things with Videogames, by Ian Bogost. Minneapolis, MN: University of Minnesota Press, 2011. 180 pp. \$18.95 paper. ISBN 9780816676477 (paper). ~the eInformation Society/the Information Society, 30(3), 236–237. <https://doi.org/10.1080/01972243.2014.896703>.
- Landers, R. N. (2014). Developing a theory of gamified learning. *Simulation & Gaming*, 45(6), 752–768. <https://doi.org/10.1177/1046878114563660>
- Lectures aren't just boring, they're ineffective, too, study finds. (2014, May 2). Science.org.
<https://www.science.org/content/article/lectures-arent-just-boring-theyre-ineffective-too-study-finds>
- McDevitt, T.M., Ormrod, J.E., Cupit, G., Chandler, M. and Aloa, V., (2012). Child development and education. Pearson Higher Education AU.
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2010). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *International Journal of Surgery*, 8(5), 336–341. <https://doi.org/10.1016/j.ijsu.2010.02.007>
- Mora, A., Riera, D., Gonzalez, C., & Arnedo-Moreno, J. (2015). A Literature Review of Gamification Design Frameworks. 2015 7th International Conference on Games and Virtual Worlds for Serious Applications (VS-Games). <https://doi.org/10.1109/vs-games.2015.7295760>
- Morschheuser, B., Hamari, J., Koivisto, J., & Maedche, A. (2017). Gamified crowdsourcing: Conceptualization, literature review, and future agenda. *International Journal of Human-computer Studies*, 106, 26–43. <https://doi.org/10.1016/j.ijhcs.2017.04.005>
- Muntean, C.I., (2011), October. Raising engagement in e-learning through gamification. In Proc. 6th international conference on virtual learning ICVL (Vol. 1, pp. 323-329).
- Nah, F. F., Telaprolu, V. R., Rallapalli, S., & Venkata, P. R. (2013). Gamification of education using computer games. In *Lecture notes in computer science* (pp. 99–107).
https://doi.org/10.1007/978-3-642-39226-9_12
- Nash, J. F. (1950). Equilibrium points in n -person games. *Proceedings of the National Academy of Sciences of the United States of America*, 36(1), 48–49.
<https://doi.org/10.1073/pnas.36.1.48>
- Nieto-Escamez, F. A., & Roldán-Tapia, M. D. (2021). Gamification as Online Teaching Strategy During COVID-19: A Mini-Review. *Frontiers in Psychology*, 12.
<https://doi.org/10.3389/fpsyg.2021.648552>
- Nowak, M. A. (2006). Five rules for the evolution of cooperation. *Science*, 314(5805), 1560–1563. <https://doi.org/10.1126/science.1133755>
- Reigeluth, C. M. (2013). Instructional-design theories and models. In *Routledge eBooks*.
<https://doi.org/10.4324/9781410603784>
- Robinson, D., & Bellotti, V. (2013, April). A preliminary taxonomy of gamification elements for varying anticipated commitment. In *Proc. ACM CHI 2013 Workshop on Designing Gamification: Creating Gameful and Playful Experiences*.
- Salen, K., & Zimmerman, E. (2003). *Rules of Play: Game Design Fundamentals*.
<http://ci.nii.ac.jp/ncid/BA63865022>
- Thoemmes, F. J., & Kim, E. S. (2011). A Systematic review of propensity score methods in the Social Sciences. *Multivariate Behavioral Research*, 46(1), 90–118.
<https://doi.org/10.1080/00273171.2011.540475>

- Utendorf, H. (2013). What Does “Gamification” Mean. *Intrepid Learning*, 30.
- Welsh, M.E., (2014). Review of Voyant tools. *Collaborative Librarianship*, 6(2), pp.96-98.
- Werbach, K. (2014). (Re)Defining Gamification: a process approach. In *Lecture notes in computer science* (pp. 266–272). https://doi.org/10.1007/978-3-319-07127-5_23
- Zichermann, G., & Cunningham, C. (2011). Gamification by design: Implementing game mechanics in web and mobile apps. <https://ci.nii.ac.jp/ncid/BB08348570>