

The Shift to Gamification in Education: A Review on Dominant Issues

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Abstract

This article examines gamification literature on education since 2011. Using highlighted themes from Kirriemuir and McFarlane's review on games and education as a starting point, the study identified 32 published papers. Furthermore, the study evaluated and identified previous conceptual and methodological approaches for evaluating gamification in education research. Using the identifying themes, the study discusses the development and use of gamification in education (Theme I), the application of gamification in education (Theme II), and the impact of gamification in education (Theme III) and propose that there is increased gamification and game elements research activities bridging the idea of gamified information systems in education and offering interesting opportunities for future research. The study concludes with future research directions for gamification in education.

Keywords

gamification, game elements, literature review, education, impact, motivation

The rapid rate of gamification adoption and the use of game elements in education have numerous effects on learner outcomes and engagement. Gamification is considered as the application of game design elements in a nongame context, purposely to promote desired behaviors or solving problems

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(Zichermann & Cunningham, 2014). The concept of gamification has encouraged an insightful number of studies in trying to understand its application in education and all spheres of life. This article reviews the current state and direction of gamification in education. Reviews are essential to the growth and learning of gamification, especially in advancing our knowledge, developing theories, and uncovering new areas of research (Webster & Watson, 2002). Recently, more studies have sought to integrate game design elements into education as well as identifying the consequences and antecedents of technology-enhanced learning and game-based learning.

Kirriemuir and McFarlane (2004) conducted one of the conceptual reviews in educational communities on the use of digital games within educational environments. Their review on games conceptualization and technology-enhanced learning identified several dominant areas or domains to approach games for education. In reference to this article, their review highlights three dominant themes on games for education research, namely, the development and use of game elements in education (Theme I), application of game elements in education (Theme II), and the impact of game elements in education (Theme III). Several games for education and game-based learning research have been conducted since their last review in 2004. Thus, in recent years, there has been the introduction of game design elements to augment educational games research (Deterding et al., 2011), which has altered the competitive education environment in enhancing learners experience. With the proliferation of research on gamification in education, the themes and how effective game elements are in engaging learners have changed, and with the change comes changes in gamification in education. Consequently, as game design elements change in education, should the way we approach and research gamification change? Hence, the guiding question in this review is how has learning been performed in the development, application, and impact of gamification in education?

Furthermore, there are still open questions as to whether game design elements are suitable to all spheres of human activities and whether their use in education is always desirable. To this end, more research questions are yet to be addressed by human-computer interaction (HCI) researchers in gamification research. Questions such as are there domains or fields of study that need not apply gamification? What techniques in gamification are appropriate to apply or most effective? Aside from the user's intention, how does gamification affect the user's psychological needs perspective?

In this article, an assessing review of gamification literature is conducted from 2011 to 2018 using highlighted themes and search criteria similar to Kirriemuir and McFarlane (2004). Thirty-two published papers were identified in this domain, which includes four review papers indicating three significant themes in gamification research in education. The review begins by defining gamification and the methodology for the literature review. After the classification of themes according to the articles, the review focus on discussing the

dominant issues such as conceptual and methodological approaches to gain insight into whether the study of gamification in education has progressed (positive, negative, or mixed results) in the gamified learning environments. Finally, the study concludes with the limitation and future research direction of gamification research.

Framing Gamification Research

In the workplace and schools, there is a history of institutions leveraging games and competitions in their activities. With innovations in digital platforms and adding game elements, the concept of gamification has sprung as a new field of study. Despite criticism of the word and its phenomenon, gamification has stuck (Werbach, 2014). Appropriately, gamification is to revolutionize education and businesses in motivating and engaging users to the desired outcome. By using adoption technique processes and harnessing educational technologies, gamification has witnessed significant growth. Start-ups whose development is associated with gamifying their activities (e.g., codecademy) have also witnessed progress. Notwithstanding, critics argue that gamification is exploitative, and the question of the uniqueness and value of gamification remains still.

The interest of the study is to understand gamification research in education. Since there is no agreed definition for the term gamification, the long-established and cited definition used is “the use of game design in a nongame context” (Deterding et al., 2011, p. 5). The generalization of what constitutes game elements are not known to gamification, making gamification research problematic as conceded by Deterding et al. Some scholars in appreciating the value of gamification view it as a process of making activities more game-like. This definition is appropriate for incorporating both practitioners and academic viewpoints and bridge the persuasive design to gamified environments (Werbach, 2014).

Furthermore, gamification foster problem solving and promote desired behaviors by applying game principles and design elements (Zichermann & Cunningham, 2011). Game components such as leaderboards, badges, points systems and levels that translate inputs to outputs are game mechanics (Hunicke et al., 2004). Similarly, the game elements (achievements, competition, rewards, and self-expression) that regulate interactions among players with game mechanics are referred to as game dynamics. The various definitions which highlight the use of game design elements are categorized in Table 1 and conceptualized to identify gamification as either a design element (Deterding et al., 2011; Werbach & Hunter, 2012; Zichermann & Cunningham, 2011; Zichermann & Linder, 2013), process technique (Fitz-Walter, 2015; Kim, 2011; Werbach, 2014), or as a service package (Huotari & Hamari, 2012). To this end, Vesa and Harviainen (2018) is of the view that “gamification is simply a ploy in search of

Table 1. Some Definitions of Gamification (Author's Construct).

Author(s)	Definition/Conceptualization
Huotari & Hamari (2012)	A form of service packaging where a core service is enhanced by a rules-based service system that provides feedback and interaction mechanisms to the user to facilitate and support the users' overall value creation.
Deterding et al. (2011)	The use of game design elements in nongame contexts.
Werbach & Hunter (2012)	The use of game elements and game-design techniques in nongame contexts.
Werbach (2014)	The process of making activities more game-like.
Fitz-Walter (2015)	A design strategy where game elements are used in non-game applications to promote behavior change and enhance the hedonistic qualities of the user experience.
Zichermann & Cunningham (2011)	The process of game-thinking and game mechanics to engage users and solve problems.

utilitarian effectiveness and emancipating the potential of game design-based thinking” (p. 1).

Based on the aforementioned definitions, Folmar (2015) posits a description to cover gamification in education and the adoption of game thinking in design. He defined gamification as “the use of game thinking and game mechanics to meet non-game ends” (p. 2). The main reason for the failure of most gamification projects in an educational context is the lack of game thinking, which mandates designers to rethink the teaching curriculum and practices. For the effectiveness of gamification, game elements should be added when there is a clear understanding of how gamification works in the educational context. In the words of Folmar (2015), gamification is not just “making a game, which imparts a lesson; it is applying game thinking to how we impart that lesson and continuing to develop it based on the feedback from the players” (p. 5).

Importance of Gamification in Education

For most educational institutions, information systems are important success factors in teaching and learning (Ofosu-Ampong et al., 2019). Although many institutions channel huge investments into educational projects that seek to develop or adapt existing information systems, most of their investment does not meet the goal of the institution. The success of these information systems in education is for the students or end-users to use the systems implemented (Hsieh & Wang, 2007). The ensuing question, therefore, is how gamification can motivate end-users and potential users in utilizing information systems. This has encouraged several research studies in explaining user acceptance and perceptions of information systems in education and importantly in predicting user behaviors. Researchers have

therefore focused on the hedonic aspect of systems by examining intrinsic and extrinsic motivation for enhancing user experience and sustaining continuous behaviors (Ryan & Deci, 2000). In this regard, gamification in information systems tries to utilize the elements from game designs to improve educational outcomes, make monotonous activities more enjoyable and make students assignments and learning more engaging (D. Liu et al., 2017). Thus, gamification can result in educational benefit especially to Generation Y who expect an interplay (Burke & Hiltbrand, 2011) between learning and games, and to the institution a cost-saving and improvement in performance (D. Liu et al., 2017).

Methodology for the Review

The downloaded articles used were from AIS Electronic Library (AISeL), Emerald, and Science Direct. The main arguments outlined in conference proceedings and working is factored, and the review used papers of peer-reviewed journal articles (Webster & Watson, 2002). The descriptors employed in the search in all three databases were “Gamification” OR “Gamification in Education.” The results from the database were categorized and sorted accordingly after reviewing the abstracts to ensure it included a gamification focus. The papers were selected from 2011 to 2018 inclusive and emphasized on gamification research in education. The methodology of the review adopted made it possible for the author to search, identify, and download the review materials. This was then placed in respective and labeled sections on gamification themes, as discussed in the sections later. This initially resulted in 315 papers, which were divided again to assess whether the papers were education-level gamification study by reviewing the title and abstracts. After excluding book chapters and duplicates, the articles remained 119.

Consequently, the evaluation resulted in the removal of business and other discipline research on gamification. After the removal of these papers, 88 papers remained for further review and analysis. After further review, 32 articles out of the 88 were considered to have a central focus on gamification in education. Base on the identified classifications in Kirriemuir and McFarlane’s (2004) review on Games and Learning, the 32 articles were coded after full-text read into three themes to highlight gamification in education research (see Table 2). Other articles fell in line with one or more themes and were classified as such and listed separately as bridging article. To further depict the inclusion and exclusion of article papers for this review, Figure 1 and the Appendix have been included to highlight the process.

Theme I: Development and Use of Gamification in Education

The development and use of gamification subcategory are related to the specific gamified systems developed by software engineers for adoption and use by educational institutions. Kirriemuir and McFarlane (2004) describe this theme as the categorization of games through complex interaction and narration and

Table 2. Articles by Themes.

Mixed themes from review	Main theme	Articles by themes	Reviews by themes
Development, software engineering process, game elements, evaluation	Theme I—Development and use of gamification	10 articles	Pedreira et al. (2015)
Software engineering education, development frameworks, game elements	Theme II—Application of game elements	4 articles	Souza et al. (2018)
E-learning, motivation, general, effect of gamification on engagement	Theme III—Impact of game elements	11 articles	Alsawaier (2018)
Gamification impact, gamification application programs, cognitive belief, gamification theories	Themes I, II, and III (bridging article)	3 articles	Osatuyi et al. (2018)

Note. The number of articles by themes is discussed under each theme.

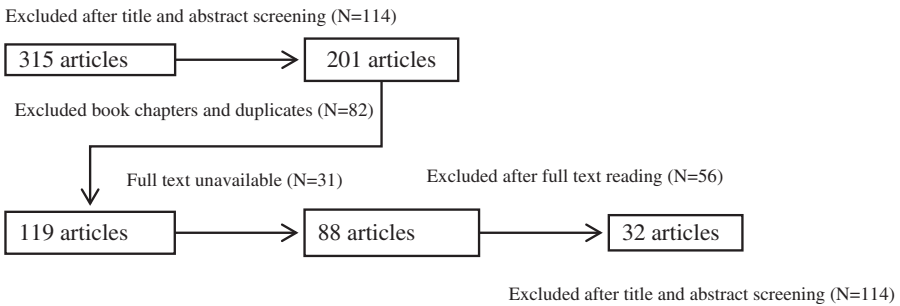


Figure 1. Screening Process in a Flow Diagram.

emphasis the prevalence of gameplay in education. In the development and use stage, Kirriemuir and McFarlane’s (2004) examined learners’ motivation to use digital games and considered the activity as “a process of participation in practice rather than a process of acquisition of facts or disconnected ‘pieces’ of information, i.e. *doing* rather than *knowing*” (p. 14).

Similarly, research under the development category of gamified systems has focused on software engineering processes that have been objects of gamification. Classification of the processes that has appeared in studies are grouped into six main blocks, namely,

project management (containing the areas of project planning and project assessment and control), software requirements (stakeholder requirements definition),

system requirements definition (software requirements analysis), software development (software implementation), software testing (software testing and verification), and support processes (process improvement, problem resolution, knowledge management, and configuration management). (see Pedreira et al., 2015, p. 161).

Proposed solutions and philosophical papers dominant more than half of the primary studies on gamification have no experimental validation.

Recent studies espoused the design principles, while earlier studies focused on conceptualizing gamification design. For instance, Kankanhalli et al. (2012) preliminarily reviewed gamification concepts and sampled applications by analyzing their goals, composition, benefits, and impact (motives, design techniques, and outcomes of gamification). Similarly, Ofosu-Ampong and Boateng (2018) examined learners' perceptions of gamification in learning as an antecedent to the development of a gamified system that focused on improving student learning outcomes through user-centric design principles.

They reported that students are highly receptive to the idea of learning through gamified courses. The study further identified the perceptions of undergraduate/postgraduate students on the development of a learning management system (LMS; Sakai) using game design elements. They questioned students about their gaming experiences, their expectations of gamification in education, and opinions on the importance of specific game design elements to increase enjoyment in a gamified course. Similarly, Schöbel et al. (2016) suggest that gamified environments can feature different competitive structures and cooperative dynamics. The scholars called for future studies to analyze user preferences to properly match gamification elements to the cooperative and competitive configurations of learners during the development of gamified classes.

Features of Gamification and the Nature of Gamified Learning

The review identified some features of gamification and the nature of gamified learning under the development and use of gamification. For instance, Chang and Wei (2016) identified and explored massive online open course (MOOC) and the mechanics drawn from the gamification. The study identified redeemable points, trophies, virtual goods, leaderboards, wordless pictures, and badges as the most engaging and ranked game mechanics. Furthermore, poor game feature or mechanics were recognized as the reason for why most online learning platforms or MOOC fail to achieve their educational goals. The authors provided a hierarchical feature of gamification to assist educators, online learning and MOOC operators the opportunity to provide an improved student engagement and experience.

The research by Mettler and Pinto (2015) sought to use serious games to disseminate research findings to wider academic and research professional communities. The authors provided a detailed review of serious games and

highlighted the features of game design that are lacking in the design of pedagogical systems. The lack of design features prevented it from its widespread use in educational setups. A proposed framework includes features such as expectations, ideas, feedback, and continuance use of the target system by the potential users in the game development. The scholars conclude that user engagement is paramount to the use of serious games in educational institutions.

Caton and Greenhill (2014) developed some features and framework that sought to improve participation and attendance in a computer module game for undergraduates. The common features used to motivate, and prompt disengaged students (in the trail group) were awards and penalties (in the form of yellow cards and red cards). The yellow represented student's low or no participation in class or group activities like discussions and red card represented a deduction of 25 marks from their overall project grade. Awards were presented in the form of points and badges for successful participation and completion of the project assignment. The study found that the trail group performed better (higher percentage) produced superior project assignment and were interested in participating in class activities than the controlled group. The instructors also identified improvement in participation and attendance with the penalty system.

The literature review on the features of gamification and the nature of gamified learning in education found that poor game features or mechanics results in failed educational goals and effective game mechanics such as virtual goods, trophies, and redeemable points can improve engagement and performance. The observation is that knowledge transfer could benefit from serious games through the iterative design process, prompt feedback, expectations, and continuance use of the target system by the potential users in the game development. In addition, penalties and awards systems were found to improve student's participation and attendance in a gamified environment.

Theme II: Application of Gamification in Education

Motivational affordances and flow experience are vital to the potential of gamification in education. Ryan and Deci (2000) differentiate between intrinsic and extrinsic motivation. Intrinsic motivation is situated in a given task while extrinsic motivation focus on external rewards such as financial compensation. This category is related to incorporating game elements into learning systems. First, contrary to the status quo in gamification research, Schöbel et al. (2016) conducted a literature review to analyze and test which gamification elements and bundles LMS users most prefer. The focus was on increasing engagement and motivation. They also investigated the number and combination of gamification elements users would implement in an LMS. They found that LMS users prefer a bundle and combination of four gamification elements (i.e., levels, points, status, and goals) and that these elements are more relevant to users than leaderboards and badges. In addition, the authors found that LMS users like to

compete against themselves rather than other users, which indicates that the interaction between game elements components and how well they align with the gamified system's objectives shape a student's experience (Cheong et al., 2014).

In addition, we also considered the classification of gamification elements or mechanics popularly used and found no generally accepted taxonomy for the game elements. We therefore made a list consisting of gamification elements from the four sampled review papers (Alsawaier, 2018; Osatuyi et al., 2018; Pedreira et al., 2015; Souza et al., 2018). The gamification elements found in the primary studies (top four reviews) were awards (given on completion of a task), points (rewards in the form of points), badges (achievement of tasks), levels (increase in points), and quests (task to complete). This indicates that developers need to consider user preferences rather than assume the one-size-fit-all approach that pushes popular elements (e.g., badges and point systems) on learners.

Theme III: Gamification in Education and Impact

The importance of users reflects this section by supporting the argument of the inclusion of learners in the gamification design (Kallookaran & Robra-Bissantz, 2016). This argument explains the success and failure of gamification systems. Referring to Kirriemuir and McFarlane's (2004), "learning is at its most vibrant when it has relevance to the learner" (p. 21). Research in this subcategory primary concerns the effects of gamification on learners and instructors; and examines the impact of gamification on users such as their attitudes (acceptance of game elements in education), emotions, learning, cognitive belief and behavior, and the impact on their learning performance (Cheong et al., 2014). Others studies focus on the effect of a gamified activity on learning (Cheong et al., 2013a); students' learning outcomes (Marshburn & Henry, 2013); coordination and interconnection (Kallookaran & Robra-Bissantz, 2016), and students motivation (Cheong et al., 2013b; Mekler et al., 2013; Su & Cheng, 2015). From the perspective of educationists, others examined whether gamification leads to an increase or decreased participation and engagement (e.g., Cheong et al., 2013a, 2013b; Freeman & Freeman, 2013; Kokkinaki et al., 2015).

Gamification Research: Conceptual Approaches

This section discusses the theoretical and framework approaches to gamification research to suggest conceptual gaps for future research. Most of the theoretical approaches underlying gameplay and gamification are guided by intrinsic motivation. The theories employed include the self-determination theory (SDT) in its original form or in an extended it (addition of new constructs) to measure user engagement and motivation. The SDT—a theory of motivation (Ryan & Deci, 2000)—is thus the most prominent in gamification research. Some recent studies

exclusively use SDT to examine gamification (e.g., L. Liu & Stacey, 2015; Schöbel & Söllner, 2016), whereas earlier studies (e.g., Kankanhalli et al., 2012) combined this theory with other theories, such as the cognitive evaluation theory (Deci & Ryan, 1985b) and the theory of gamified learning (Landers, 2015). For example, van Roy et al. (2018) in a theory development use SDT to examine how gamification works on a psychological needs perspective of students by analyzing student's involvement and processes in the gamified course and how they assign meaning to the badges or PBL. Using a qualitative approach to unearth the results, they found that badges which serve as encouragement are considered *performance-contingent* rewards in that it facilitates the successful completion of learning activities. The theoretical implication of this study is that badges, on the whole, do not produce specific motivational effects on a consistent basis, however, produces varied motivational functions or conflicting results.

In the context of games or game design elements, Ryan et al. (2006) conclude that "people are attracted to video games because they experience autonomy, competence, and relatedness while playing"(p. 2). In light of this, other studies use the flow theory (Kankanhalli et al., 2012; Korn, 2012), developed by Csikszentmihalyi (1990), and self-efficacy theory (Kamal et al., 2013; Sjöklint et al., 2013; Vassileva, 2012) by Bandura (1977) to predict learner behaviors and outcomes. In gamification, flow theory posits a certain level of challenge. The challenge corresponds to the skills of the player, with a clear goal and immediate feedback to facilitate a state of flow in the game.

On the other hand, the self-efficacy theory looks at the players' perception of the games in terms of completion and winning (i.e., personal belief and ability to succeed necessitate their intentions to play). Other evident theories applied to gamification and education include the theory of planned behavior (Hamari & Koivisto, 2013; Vassileva, 2012), the theory of gamified learning (Ofosu-Ampong & Boateng, 2018), and uses and gratification theory (Kamal et al., 2013; Kankanhalli et al., 2012). Notwithstanding the various theories applied to gamification, the review identified a gap (disconnect) between theories and practice. Accordingly, the growth of the field is limited in instances where theories are unexamined empirically in gamification (Alsawaier, 2018; Seaborn & Fels, 2015). To bridge the gap between theory and practice in the field of gamification, there is a need for research with strong theoretical links.

Furthermore, studies which adopt framework-based approaches include (a) a model to investigate preference for the use of gamification in a learning activity (Filippou et al., 2014), (b) social gamification framework for a K-6 learning platform (Simões et al., 2012), (c) gamification of learning and instruction: game-based methods and strategies for training and education, and (d) a method for the design of gamified training (Helms et al., 2015). Table 3 represents the research issues and conceptual approaches.

Table 3. Conceptual Approaches to Gamification Research (Authors' Constructs).

Gamification in Education subcategory	Research issue	Classification of conceptual approach	Study
Development and use of gamification	Gamification: a new paradigm for online user engagement	Theoretical	Kankanhalli et al. (2012)
	Gamifying information systems—adapting gamification to individual preferences	Framework	Schöbel & Söllner (2016)
	Transforming homo economicus into homo ludens: a field experiment on gamification in a utilitarian peer-to-peer trading service	Theoretical	Hamari (2013)
	Gamifying LMS (Sakai): understanding the perception of students on game elements for learning	Theoretical	Cheong et al. (2014); Ofosu-Ampong & Boateng (2018)
	Understanding the effects of mobile gamification on learning performance	Theoretical	Wu & Wang (2014)
Application of gamification	A model to investigate preference for the use of gamification in a learning activity	Framework	Filippou et al. (2014)
	A social gamification framework for a K-6 learning platform	Framework	Simões et al. (2012)
	The gamification of learning and instruction: game-based methods and strategies for training and education	Framework	Kapp (2012)
	A method for the design of gamified training	Framework	Helms et al. (2015)
	Identifying student types (gaming habit) in a gamified learning experience	NA	Barata et al. (2013)
	Using design science research to incorporate gamification into learning activities	Framework	Cheong et al. (2013b)

(continued)

Table 3. Continued

Gamification in Education subcategory	Research issue	Classification of conceptual approach	Study
Impact of gamification	Incorporating game dynamics in LMS	Framework	Frost et al. (2015)
	Gamification of technology-mediated training: not all competition is the same	Theoretical	Santhanam et al. (2016)
	Investigating how social factors predict attitude towards gamification and intention to continue using gamified services	Theoretical	Hamari & Koivisto (2013)
	Twittermania: understanding how social media technologies impact engagement and academic performance of a new generation of learners	Theoretical	Osatuyi & Passerini (2016)
	Engaging engineering students with gamification	NA	Barata et al. (2013)
	Investigates how social factors predict attitude towards gamification and intention to continue using gamified services	Theoretical	Hamari & Koivisto (2014)
The corresponding increase in students' motivation and learning achievement (interpersonal relationship and performance with gamification)		Theory	Botha & Herselman (2016); Filippou et al. (2014); Marshburn & Henry (2013); Pelopida & Kokkinaki (2014); Su & Cheng (2015); Wu & Wang (2014)

Note. LMS = learning management system; NA = not applicable.

Gamification Research: Methodological Approaches

This section discusses the methodological approaches used in gamification research. The two main approaches used in gamification research are nonempirical and empirical research methods. The nonempirical research methods used were conceptual orientation (Lee & Hammer, 2011), illustration (Stokes, 2005), design science (Fitz-Walter, 2015; Simões et al., 2010), and theoretical analysis (Stott & Neustaedter, 2013). Empirical research methods (systematic collection and analysis of data) include sample survey which was widely used (Filippou et al., 2014; Ofosu-Ampong & Boateng, 2018; Schöbel et al., 2016), simulation (Su & Cheng, 2015), and experiment—randomized control trials (Boeker et al., 2013; Cheong et al., 2013a; Hamari & Koivisto, 2013; Zichermann & Cunningham, 2011). Survey and experiment were the quantitative empirical research methods that recorded the highest number in 2017 and were most prevalent, accounting for 70% of gamification research (Osatuyi et al., 2018). Studies that used qualitative empirical research method were very few (Aldemir et al., 2018; Insley & Nunan, 2014) but was very detailed and in-depth. A study by Insley and Nunan (2014) reported that game design elements are useful in promoting and enhancing the experience of users but cautioned that without appropriate management, users can subvert gamification strategies to create their games which increases competitive pressure between them.

Discussion of Issues and Evidence

First, concerning the *development and use of gamification*, institutions face numerous challenges in the design of gamification. The possible means of overcoming this challenge has been the sharing of experiences and findings on the design of gamified programs (Osatuyi et al., 2018). Recent studies focus on developing design principles (Cheong et al., 2013b; Kankanhalli et al., 2012; Ofosu-Ampong & Boateng, 2018), whereas previous studies conceptualized the design of courses or learning materials to be gamified. Documenting how institutions overcome gamification challenges provide design roadmaps and insights which are useful for developers who seek to gamify classes. The study identified the need for future studies to develop recommendations for gamified courses using the design science approach. Thus, previous studies on design suggest that design principles governing gamification in recent studies are not entirely identified and the gap may be known in future research (El-Masri et al., 2015; Pedreira et al., 2015).

To this end, El-Masri et al. (2015) provide the seven design principles of educational games. These designs, when systematically followed, benefit the instructors and students in improving students' performance. The studies focused on the effects of game elements on learners and examined the design of gamified mobile platforms in a model-verification study (Wu & Wang, 2014).

Thus, creating a typology that motivates and engages learners through game elements enhances learning outcomes and quick feedback. Research in this category recognizes the different behaviors and motives of players or learners and should endeavor to understand these different learners at every stage of the design. Thus, new studies should focus on tailoring incentives that motivate learners over time, examining each segment of learners, and adopting game elements that best suit learners.

During the review, we identified future research from the category of development and use of gamification. In considering gamification, gamified environments feature different cooperative dynamics and competitive structures. Hence, the call for further studies to investigate user preference to match the cooperative dynamics and competitive structures with the gamified environment and, most importantly, before designing the system for learners (Schöbel et al., 2016). Also, to better understand game elements for learner's use, Cheong et al. (2014) recommend a longitudinal study. They indicate that based on the feedback and assessments of instructors and learners, game elements should be incorporated into educational systems and studied throughout its use. Similarly, Ofosu-Ampong & Boateng (2018) propose incorporating game elements into existing LMSs. Kokkinaki et al. (2015) also recommend further studies on how gamification can be developed to promote all facets of the general pedagogical strategies in teaching and learning.

Application Programs of Gamification

Concerning the application programs of gamification, previous studies focus on user's different kinds of game elements in LMS, which motivates and engages them. The most combined and preferred game design elements are points, levels, goals and status. Also, game players prefer to compete against themselves rather than other players, which indicates that the interaction between game elements' components, mechanics and how well they align with the gamified system (objectives) shape students experience (Cheong et al., 2014). However, within gamification research, learning outcomes are not directly affected by applying game elements alone irrespective of the type of LMS in place (Schöbel et al., 2016). Consequently, there is the need to align the gamified system to the interactions and behavioral intentions of students to identify how the game elements can lead to student's meaningful engagement (Ofosu-Ampong et al., 2019).

Furthermore, Table 4 shows that empirical research on gamified activities is diverse and entails different combinations of game elements and different results. As can be seen in the table, points, leaderboards, and badges are the dominant the game elements mostly used, however, "without a discernible systematic experimental approach, it is difficult to identify which game elements or configurations are most effective in promoting engagement and supporting learning for a given activity and group of learners" (Dichev & Dicheva,

Table 4. Review of Literature on Game Elements for Motivating Learners.

Game elements	Content gamified	Related theory	Result of impact	Study
Points and rewards	mHealth App—measuring blood glucose level	NA	Positive	Cafazzo et al. (2012)
Points, rewards and badges	Electrical course	NA	Positive	Todor & Pítica (2013)
Badges	NA	Intrinsic motivation	Positive	Gibson et al. (2015)
Points, badges and status	Social interaction forum	Intrinsic and extrinsic motivation	Negative ^a	Thom et al. (2012)
Levels and graphical rewards	Teaching physical activity	NA	Positive	Consolvo et al. (2008)
Leaderboards and points	Computer environmental course	NA	Positive	Gnauk et al. (2012)
Progress bars and rewards	Teaching e-learning software	Behaviorism/learning theory	Positive	Raymer (2011)
Graphical rewards, feedback and points	Course in health and sustainable behaviors	NA	Negative	Y. Liu et al. (2011)
Leaderboards, points, and levels	Computer software course	Motivational theory	Negative	Berkling & Thomas (2013)
Points and leaderboards	Electronic media course	Situated motivational affordance	Mixed	Leaning (2015)
Levels, badges and points	Teaching software engineering and programming	NA	Positive	Kumar & Khurana (2012)
Progress bars, points, leaderboards, charts and timers	Gamified quiz	Mediators from Technology acceptance	Positive	Filippou et al. (2014)
Badges and leaderboards	Teaching college modules	NA	Positive	Hanus & Fox (2015)
Leaderboards, ranks, points, real-world rewards	Virtual 3D avatars development course	NA	Positive ^b	Featherstone & Habgood (2018)
Challenges, levels, points leaderboards, badges	Teaching a computer engineering course	NA	Positive	Barata et al. (2013)

Note. NA = not applicable.

^aParticipants' motivation declined significantly with the removal of game elements.

^bParticipants cheat when there is lack of motivation since they want to progress in the line of duty meaningfully.

2017, p. 14). By adopting a systematic experimental approach, future research can map out the effectiveness of game elements configurations in supporting learners. The following are results of game elements reviewed and widely used by researchers and practitioners to motivate and engage learners.

Villagrassa et al. (2014) sought to increase students' motivation and engagement in a computer animations program by applying gamification and visual technologies. Using a mixed-method approach to identify the positive and negative implications of the system, the LMS which was gamified utilized game mechanics such as points, badges, avatars, and quest. The gamified LMS employed LEGO themes which display the adventure maps, analytics, avatars and missions to offer students a gamified social environment to collaborate in discussions, receive feedback on assignments, and compete. The study found a positive perception and a high motivation among students to work in a 3D with the gamified system.

Gamification and Impact

The impact and outcomes of gamification are witnessed in most studies (Hanus & Fox, 2015). Research under the impact of gamification is categorized into seven identified themes (dominantly raised in the review), namely, cognitive belief and behavior, attitude, performance, learning, interpersonal relationship, motivation, and engagement. For example, Cheong et al. (2013a) examined the effect of gamification on learning activities and how it impacts learning performance. The study revealed that gamification improves learners' self-efficacy and productivity. Most studies adopted a sociotechnical approach of involving users and seeking their views before designing the application. The papers also revealed that students are open to learning with a gamified course and have a strong desire for social interaction. For example, Ofosu-Ampong and Boateng (2018) conducted an explorative study (precursor) for students in Ghana and recommended that educational institutions should prioritize the use of existing LMS or organizational systems used by students to incorporate the game design elements. To the scholars, this prevents institutions from developing the system (cost) from scratch. Because the students are used to the system, it becomes easier accepting the new features incorporated. The students, on the other hand, were receptive to the idea of including game elements in the Sakai LMS of the university. Gamified courses should therefore focus on students' progression (performance) and quick feedback mechanism to encourage engagement.

The review found that empirical research on gamified systems are not clear how gamification is influencing motivation. Most critical studies have put in evidence that shows how their methodology increases extrinsic motivation and reduces the intrinsic, which is fundamental for meaningful learning (Nicholson, 2012). However, experimental results in general studies show a positive relationship between gamification and motivation intrinsic (Mekler et al., 2013), while

others find no correlation in their studies (Mekler et al., 2013). The SDT proves that gamification promotes a source of motivation between the dimensions of *introjection* and *identification* of the model, that is, the student is motivated by an improvement of him/herself, even if awarded extrinsically with badges and other elements typical of the game (Deci & Ryan, 1985a; Gooch et al., 2016).

Furthermore, using game design elements to gamify an e-course on anti-plagiarism, Pelopida and Kokkinaki (2014) focused on the initial development and implementation in a classroom environment. The study reported that the learners perceived the impact of game elements on their cognitive processes, importantly enhancing their learning outcomes through mobile gamification. Schöbel and Söllner (2016) delve further by developing a framework to modify the preference of users and user motivation patterns when incorporating game elements into LMS. Wu and Wang (2014) applied gamification pedagogy to a coursework to identify the different elements that promoted cognitive belief and behaviour in learners and proposed a new pedagogical paradigm that encourages situated mobile learning. Some studies also adapted course modules to individual learners' styles to encourage continual use. In exploring the impact of gamification in education, the review found out that some elements of games were more effective than others in motivating learners.

In an online game-annotation task, Mekler et al. (2013) found that points and meaningful framing independently increased intrinsic motivation. Likewise, Cheong et al. (2013b) found progress bars and leaderboards as the most effective game elements that motivate learners. In addition, animations, video clips, and educational games were found to effectively strengthen the potential for students' to learning in a gamified setting (Kokkinaki et al., 2015). Other papers focused on how designers integrate game elements and suggested a careful consideration in this approach to boost learners. Hence, Helms et al. (2015) advised that despite the potential benefit of gamification has on modifying learners' motivation, one need to systematically implement game elements into learning activities to avoid the risk of focusing students' attention on game elements (excitement) rather than the intended goals. Other studies examined the effect of personal characteristics on engagement in gamified learning. In using the technology-mediated learning (TML) system approach, Shen et al. (2016) identified two individual differences—gender and achievement goals—in competitive gamified TML designs. They found that gender plays an important moderating role—males engage more and learn better in a competitive learning context than females. Their findings indicate that gender and achievement goals are significant individual differences to consider in designing gamified TML and explaining its outcomes. The following are the identified areas for further research based on this review. Thus, to understand the influence on user cognition and psychological behaviors in learning, future research needs to explore how user characteristics interact with game elements and under what conditions would a user interact more with the gamified system.

With an emphasis on the fundamentals of learning in Bloom's hierarchy (i.e., focus on the bottom layer), Cheong et al. (2014) incorporated game elements in an IT program. They encouraged future research to focus on using different approaches such as triangulation to "ascertain if gamification elements promote learning." Also, different approaches to implement gamification should be explored in educational settings—as a means to position learning or teaching with gamified systems at the top of Bloom's hierarchy. Santhanam et al. (2016) also called for future studies to investigate the degree to which gamification affected students' cognitive behaviors and recommended the need to apply the appropriate theoretical approaches to the variations in gamification design concerning learners' cognitive beliefs.

In summary, for gamification to be proven effective and successful, it is dependent on users using the gamified system in learning. Hence, measurement should focus on context, performance, curriculum (course), and organizational setup of the educational institution.

Limitation

The study focused on gamification literature on educational (learning motivations) publications, notwithstanding the industry prevalence of gamification studies. Consequently, other theories and phenomenon applying out of the scope of education might be missing out due to the center-focused nature of the article.

Conclusion and Future Research Directions

By extending Kirriemuir and McFarlane's (2004) investigation into games and education, this article highlights and advance the development and use of game design elements, application of game design elements, and the impact of game design elements. Overall, the study draws a conclusion of gamification in education and the trajectory of game elements research over time and provides some design guidelines for future gamified systems.

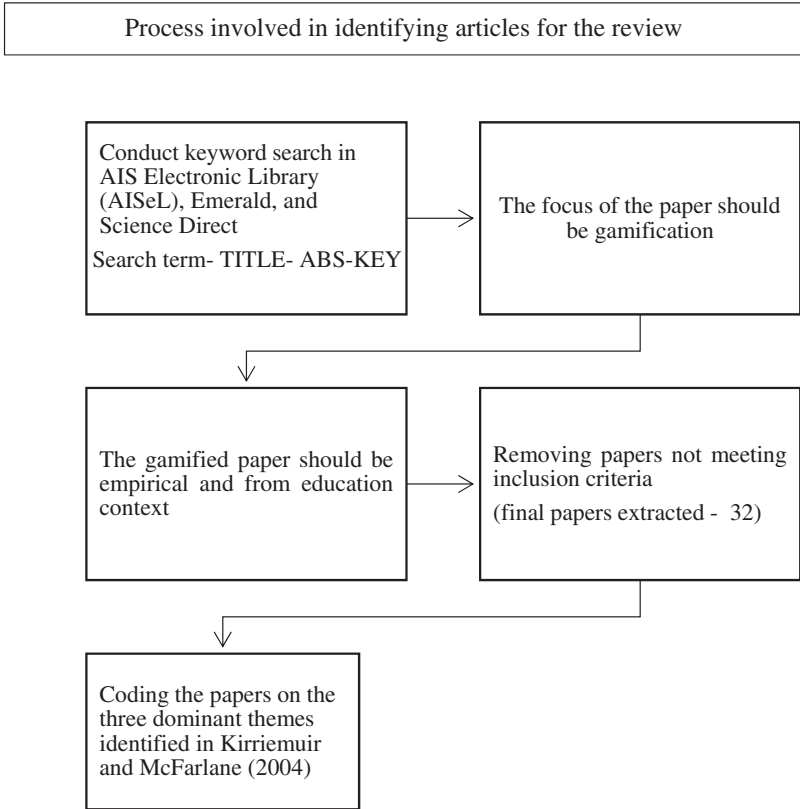
The study found that understanding the learners and the classroom environment is considered a vital recommendation for educational institutions planning on adopting gamification. Also, specific game elements need to be investigated for use rather than assume an underlying concept (Hanus & Fox, 2015). Thus, generalizing game elements for learners without understanding the context of the educational institutions or user background is a recipe for gamification failure.

Gaps Identified

In studying the impact of gamification on learners, there is a need for a more complex model that includes moderating and mediating variables. To this end, recent studies have added variables like motivation and game preference, unlike the personality of the learner and learning environments. It is the hope of the

researcher that future research will continue to explore gamification in education and examine the interplay of students and institutional factors in determining behavioral and continual use of gamified systems.

Appendix



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References

- Aldemir, T., Celik, B., & Kaplan, G. (2018). A qualitative investigation of student perceptions of game elements in a gamified course. *Computers in Human Behavior, 78*, 235–254.
- Alsawaier, R. S. (2018). The effect of gamification on motivation and engagement. *International Journal of Information and Learning Technology, 35*(1), 56–79.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191–215.
- Barata, G., Gama, S., Jorge, J., & Gonçalves, D. (2013). Improving participation and learning with gamification. In *International Conference on Gameful Design, Research, and Applications* (pp. 10–17). ACM.
- Berkling, K., & Thomas, C. (2013). Gamification of a software engineering course. In *International Conference on Interactive Collaborative Learning* (pp. 525–530). IEEE.
- Boeker, M., Andel, P., Vach, W., & Frankenschmidt, A. (2013). Game-based e-learning is more effective than a conventional instructional method: A randomized controlled trial with third-year medical students. *PLoS One, 8*(12), e82328.
- Botha, A., & Herselman, M. (2016, May 18–20). Rural teachers as innovative co-creators: An intentional teacher professional development strategy. In *Proceedings of the International Conference on Information Resources Management*. Cape Town, South Africa.
- Burke, M., & Hiltbrand, T. (2011). How Gamification Will Change Business Intelligence. *Business Intelligence Journal, 16*(2), 8–16.
- Cafazzo, J. A., Casselman, M., Hamming, N., Katzman, D. K., & Palmert, M. R. (2012). Design of an mHealth app for the self-management of adolescent type 1 diabetes: A pilot study. *Journal of Medical Internet Research, 14*, e70. <https://doi.org/10.2196/jmir.2058>.
- Caton, H., & Greenhill, D. (2014). Rewards and penalties: A gamification approach for increasing attendance and engagement in an undergraduate computing module. *International Journal of Game-Based Learning (IJGBL), 4*(3), 1–12.
- 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.
- Cheong, C., Cheong, F., & Filippou, J. (2013a). Quick quiz: A gamified approach for enhancing learning. In Lee, J. N., Mao, J. Y., & Thong, J. (Eds.), *Proceedings of the Pacific Asia Conference on Information Systems* (pp. 1–14). AIS Electronic Library.
- Cheong, C., Cheong, F., & Filippou, J. (2013b). Using design science research to incorporate gamification into learning activities. In Lee, J. N., Mao, J. Y., & Thong, J. (Eds.), *Proceedings of the Pacific Asia Conference on Information Systems* (pp. 1–14). AIS Electronic Library.
- Cheong, C., Filippou, J., & Cheong, F. (2014). Towards the gamification of learning: Investigating student perceptions of game elements. *Journal of Information Systems Education, 25*(3), 233–244.
- Consolvo, S., Klasnja, P., McDonald, D. W., Avrahami, D., Froehlich, J., LeGrand, L., Libby, R., Mosher, K., & Landay, J. A. (2008). Flowers or a robot army? Encouraging awareness and activity with personal, mobile display. In *UbiComp*

- 2008: *Proceedings of the 10th International Conference on Ubiquitous Computing* (pp. 54–63). ACM Press. <https://doi.org/10.1145/1409635.1409644>.
- Deci, E. L., & Ryan, R. M. (1985a). The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality, 19*, 109–134.
- Deci, E. L., & Ryan, R. M. (1985b). *Cognitive evaluation theory*. Springer.
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). *Gamification: Toward a definition* [Paper presentation]. In *Proceedings of the CHI 2011 Gamification Workshop*, Vancouver, BC, Canada, 7–12 May 2011.
- Dichev, C., & Dicheva, D. (2017). Gamifying education: What is known, what is believed and what remains uncertain: A critical review. *International Journal of Educational Technology in Higher Education, 14*(1), 9.
- El-Masri, M., Tarhini, A., Hassouna, M., & Elyas, T. (2015). A design science approach to gamify education: From games to platforms. In *Proceedings of the European Conference on Information Systems* (pp. 26–38). AIS Electronic Library.
- Featherstone, M., & Habgood, J. (2018). UniCraft: Exploring the impact of asynchronous multiplayer game elements in gamification. *International Journal of Human-Computer Studies, 127*, 150–168.
- Filippou, J., Cheong, C., & Cheong, F. (2014). Improving study habits using a behaviour change framework incorporating social motivation and gamification [Paper presentation]. In *Proceedings of the Pacific Asia Conference on Information Systems, PACIS 2014 Proceedings* (pp. 264). <http://aisel.aisnet.org/pacis2014/264>
- Fitz-Walter, Z. J. (2015). *Achievement unlocked: Investigating the design of effective gamification experiences for mobile applications and devices* [Doctoral dissertation]. Queensland University of Technology.
- Folmar, D. (2015). *Game it Up!: Using gamification to incentivize your library (Vol. 7)*. Rowman and Littlefield.
- Freeman, M. B., & Freeman, A. (2013). The game of information systems higher education. In *IAIM Proceedings* (pp. 1–14). SIGed: IAIM.
- Frost, R. D., Matta, V., & MacIvor, E. (2015). Assessing the efficacy of incorporating game dynamics in a learning management system. *Journal of Information Systems Education, 26*(1), 59–70.
- Gibson, D., Ostashevski, N., Flintoff, K., Grant, S., & Knight, E. (2015). Digital badges in education. *Education and Information Technology, 20*(2), 403–410. <https://doi.org/10.1007/s10639-013-9291-7>
- Gnauk, B., Dannecker, L., & Hahmann, M. (2012). Leveraging gamification in demand dispatch systems. In *Proceedings of the 2012 Joint EDBT/ICDT Workshops* (pp. 103–110). ACM.
- Gooch, D., Vasalou, A., Benton, L., & Khaled, R. (2016). Using gamification to motivate students with dyslexia. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (pp. 969–980). ACM.
- Hamari, J. (2013). Transforming homo economicus into homo ludens: A field experiment on gamification in a utilitarian peer-to-peer trading service. *Electronic commerce research and applications, 12*(4), 236–245.
- Hamari, J., & Koivisto, J. (2013). Social motivations to use gamification: An empirical study of gamifying exercise [Paper presentation]. In *Proceedings of the European Conference on Information Systems*, Utrecht, Netherlands, 5–8 June 2013.

- Hanus, M. D., & Fox, J. (2015). Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. *Computers and Education, 80*, 152–161.
- Helms, R. W., Barneveld, R., & Dalpiaz, F. (2015). A method for the design of gamified trainings [Paper presentation]. In *Proceedings of the Pacific Asia Conference on Information Systems*. <http://aisel.aisnet.org/pacis2015>.
- Hsieh, P. J. J., & Wang, W. (2007). Explaining employees' extended use of complex information systems. *European Journal of Information Systems, 16*(3), 216–227.
- Hunicke, R., Leblanc, M., & Zubek, R. (2004). MDA: A formal approach to game design and game research [Paper presentation]. In *Proceedings of the Challenges in Games AI Workshop*. 19th National Conference of Artificial Intelligence (pp. 1–5). AAAI Press.
- Huotari, K., & Hamari, J. (2012). Defining gamification: A service marketing perspective [Paper presentation]. In *Proceedings of the 16th International Academic MindTrek Conference*, Tampere, Finland.
- Inslay, V., & Nunan, D. (2014). Gamification and the online retail experience. *International Journal of Retail and Distribution Management, 42*(5), 340–351.
- Kallookaran, M., & Robra-Bissantz, S. (2016). Using gamification to decrease anonymity in larger learning environments. In *Proceedings of the Americas Conference on Information Systems*. <https://aisel.aisnet.org/amcis2016/ISEdu/Presentations/1/>
- Kamal, N., Fels, S., McGrenere, J., & Nance, K. (2013). Helping me helping you: Designing to influence health behaviour through social connections. In *IFIP Conference on Human-Computer Interaction* (pp. 708–725). Springer.
- Kankanhalli, A., Taher, M., Cavusoglu, H., & Kim, S. H. (2012). Gamification: A new paradigm for online user engagement. In *Proceedings of the 33rd International Conference on Information Systems*, Orlando, FL.
- Kapp, K. M. (2012). *The gamification of learning and instruction: game-based methods and strategies for training and education*. John Wiley & Sons.
- Kim, A. J. (2011). *Smart gamification: Seven core concepts for creating compelling experiences*. <http://www.youtube.com/watch>
- Kirriemuir, J., & McFarlane, A. (2004). *Literature review in games and learning*. A Graduate School of Education, University of Bristol: Futurelab. <http://www.futurelab.org.uk>
- Kokkinaki, A. I., Christoforos, A., & Melanthiou, Y. (2015). Integrating open educational resources to foster serious games and gamification design principles [Paper presentation]. *Proceedings of the Mediterranean Conference on Information Systems. MCIS 2015 Proceedings*. (pp.23). <http://aisel.aisnet.org/mcis2015/23>
- Kumar, B., & Khurana, P. (2012). Gamification in education: Learn computer programming with fun. *International Journal of Computers and Distributed Systems, 2*(1), 46–53.
- Landers, N. R. (2015). Developing a theory of gamified learning: Linking serious games and gamification of learning. *Simulation & Gaming, 45*(6), 752–768.
- Leaning, M. (2015). A study of the use of games and gamification to enhance student engagement, experience, and achievement on a theory-based course of an undergraduate media degree. *Journal of Media Practice, 16*(2), 155–170. <http://doi.org/10.1080/14682753.2015.1041807>
- Lee, J. J., & Hammer, J. (2011). Gamification in education: What, how, why bother? *Academic Exchange Quarterly, 15*(2), 1–5.

- Liu, D., Santhanam, R., & Webster, J. (2017). Toward meaningful engagement: A framework for design and research of gamified information systems. *MIS Quarterly*, *41*(4), 1011-1034.
- Liu, L., & Stacey, P. K. (2015). The development process of intrinsic gamification in a learning difficulty context [Paper presentation]. *UK Academy for Information Systems Conference Proceedings (UKAIS)*, Oxford, UK.
- Liu, Y., Alexandrova, T., & Nakajima, T. (2011). Gamifying intelligent environment. In *Proceedings of the 2011 International ACM Workshop on Ubiquitous Meta User Interfaces* (pp. 7–12). ACM.
- Marshburn, D. G., & Henry, R. M. (2013). Improving knowledge coordination in early stages of software development using gamification [Paper presentation]. In *Proceedings of the Southern Association for Information Systems Conference, SAIS 2013 Proceedings* (pp. 23). <http://aisel.aisnet.org/sais2013/23>
- Mekler, E. D., Brühlmann, F., Opwis, K., & Tuch, A. N. (2013). Disassembling gamification: The effects of points and meaning on user motivation and performance [Paper presentation]. In *Proceedings of the CHI'13 Extended Abstracts on Human Factors in Computing Systems*, 27 April 2013 (pp. 1137–1142).
- Mettler, T., & Pinto, R. (2015). Serious games as a means for scientific knowledge transfer—A case from engineering management education. *IEEE Transactions on Engineering Management*, *62*(2), 256–265.
- Nicholson, S. (2012). Strategies for meaningful gamification: Concepts behind transformative play and participatory museums. *Meaningful Play*. <http://scottnicholson.com/pubs/meaningfulstrategies.pdf>
- Ofosu-Ampong, K., & Boateng, R. (2018). Gamifying Sakai: Understanding game elements for learning. In *Twenty-fourth Americas Conference on Information Systems* (pp. 1–10). Association for Information Systems Electronic Library.
- Ofosu-Ampong, K., Boateng, R., Anning-Dorson, T., & Kolog, E. A. (2019). Are we ready for Gamification? An exploratory analysis in a developing country. *Education and Information Technologies*, 1–20. <https://doi.org/10.1007/s10639-019-10057-7>.
- Osatuyi, B., Osatuyi, T., & de la Rosa, R. (2018). Systematic review of gamification research in IS education: A multi-method approach. *Communications of the Association for Information Systems*, *42*(1), 5.
- Osatuyi, B., & Passerini, K. (2016). Twittermania: Understanding how social media technologies impact engagement and academic performance of a new generation of learners. *Communications of the Association for Information Systems*, *39*, 23.
- Pedreira, O., García, F., Brisaboa, N., & Piattini, M. (2015). Gamification in software engineering—A systematic mapping. *Information and Software Technology*, *57*, 157–168.
- Pelopida, P., & Kokkinaki, A. I. (2014). Employing gameful design and development for an open educational resource on anti-plagiarism [Paper presentation]. In *Proceedings of the 8th Mediterranean Conference on Information Systems*, Verona, Italy, 3–5 September. CD-ROM. ISBN: 978-88-6787-273-2. <http://aisel.aisnet.org/mcis2014/9>
- Raymer, R. (2011). Gamification: Using game mechanics to enhance eLearning. *eLearn Magazine*. <http://elearnmag.acm.org/featured.cfm?aid=2031772>
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*, 68–78.

- Ryan, R. M., Rigby, C. S., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and emotion, 30*(4), 344–360.
- Santhanam, R., Liu, D., & Shen, W. C. M. (2016). Gamification of technology-mediated training: Not all competitions are the same. *Information Systems Research, 27*(2), 453–465.
- Schöbel, S., & Söllner, M. (2016). How to gamify information systems—adapting gamification to individual user preferences [Paper presentation]. In *Proceedings of the 24th European Conference on Information Systems (ECIS), 2016*. Istanbul, Turkey.
- Schöbel, S., Söllner, M., & Leimeister, J. M. (2016). The agony of choice—analyzing user preferences regarding gamification elements in learning management systems [Paper presentation]. In *Proceedings of the 37th International Conference on Information Systems, Dublin, Ireland*. <https://aisel.aisnet.org/icis2016/HumanBehavior/Presentations/10/>
- Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *International Journal of Human-Computer Studies, 74*, 14–31.
- Shen, W. C. M., Liu, D., Santhanam, R., & Evans, D. A. (2016). Gamified technology-mediated learning: The role of individual differences [Paper presentation]. In *Proceedings of the Pacific Asia Conference on Information Systems, PACIS 2016 Proceedings* (pp. 47). <http://aisel.aisnet.org/pacis2016/47>
- Simões, J., Redondo, R., Vilas, A., & Aguiar, A. (2014). Using gamification to improve participation in social learning environments. *Learning and Diversity in the Cities of the Future* (pp. 169–185).
- Souza, M. R., Veado, L., Moreira, R. T., Figueiredo, E., & Costa, H. (2018). A systematic mapping study on game-related methods for software engineering education. *Information and Software Technology, 95*, 201–218.
- Stokes, B. G. (2005). Videogames have changed: Time to consider serious games? *Development Education Journal, 11*(3), 12.
- Stott, A., & Neustaedter, C. (2013). Analysis of gamification in education (technical report no. 2013-0422-01). Simon Fraser University.
- Su, C. H., & Cheng, C. H. (2015). A mobile gamification learning system for improving the learning motivation and achievements. *Journal of Computer Assisted Learning, 31*(3), 268–286.
- Thom, J., Millen, D., & DiMicco, J. (2012). Removing gamification from an enterprise SNS. In *Proceedings of the ACM 2012 Conference on Computer Supported Cooperative Work. Presented at CSCW'12* (pp. 1067–1070). ACM.
- Todor, V., & Pitică, D. (2013). The gamification of the study of electronics in dedicated e-learning platforms. In *Proceedings of the 36th International Spring Seminar on Electronics Technology* (pp. 428–431). IEEE.
- van Roy, R., Deterding, S., & Zaman, B. (2018). Collecting Pokémon or receiving rewards? How people functionalise badges in gamified online learning environments in the wild. *International Journal of Human-Computer Studies, 127*, 62–80. <https://doi.org/10.1016/j.ijhcs.2018.09.003>.
- Vassileva, J. (2012). Motivating participation in social computing applications: A user modeling perspective. *User Modeling and User-Adapted Interaction, 22*(1–2), 177–201.
- Vesa, M., & Harviainen, J. T. (2018). Gamification: Concepts, consequences, and critiques. *Journal of Management Inquiry, 28*(2), 128–130. <https://doi.org/10.1177/1056492618790911>

- Villagrasa, S., Fonseca, D., Redondo, E., & Duran, J. (2014). Teaching case of gamification and visual technologies for education. *Journal of Cases on Information Technology (JCIT)*, 16(4), 38–57.
- Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS Quarterly*, 26(2), xiii–xxiii.
- Werbach, K. (2014). (Re) defining gamification: A process approach. In *International conference on persuasive technology* (pp. 266–272). Springer.
- Werbach, K., & Hunter, D. (2012). *For the win: How game thinking can revolutionize your business*. Wharton Digital Press.
- Wu, Y. L., & Wang, W. T. (2014). Understanding the effects of mobile gamification on learning performance [Paper presentation]. In *Proceedings of the 20th Americas Conference on Information Systems*. AIS Electronic Library. <https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1693&context=amcis2014>
- Zichermann, G., & Cunningham, C. (2011). *Gamification by design: Implementing game mechanics in web and mobile apps*. O'Reilly Media.
- Zichermann, G., & Linder, J. (1989). *The gamification revolution, 2013, ISBN: 978-963-9493-69-8M. Young, the technical writer's handbook*. University Science.

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