Gamification in Higher Education: A Systematic Literature Review with Particular Reference to Octalysis as the Futuristic Framework for Further Research

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Purpose of the Study

The literature review explores the dynamic improvements in gamification in higher education and the feasibility of enhancing the student's motivation and engagement with the learning process by dwelling more on the behavioral aspects of motivation.

Background of the Study

An educator's goal has always been to achieve higher student success in learning outcomes. Making students interested in learning is one of the critical factors in achieving that goal. Teachers can use technology to enhance student learning by incorporating quizzes, tests, and the like with prompt feedback (Faiella & Ricciardi, 2015). During the past decade, 'gamification' has become a buzzword in business, medical and educational fields that has attracted many researchers. Though there are many definitions of "gamification" in use, for this study, the definition of Educause will be adopted: "Gamification is the application of game elements in non-gaming situations, often to motivate or influence behavior" (Educause, 2011).

With the availability of educational games such as ClassDojo, Socrates, Kahoot, and Quizlet, teachers could apply those software applications to gamify learning in the classroom (Hanus & Fox, 2015).

Introduction

About Gamification

The concept remained dormant despite the term" gamification," coined by Nick Pelling two decades ago in 2002. It did not gather steam till 2011, and gamification has attracted educational research scholars' attention (Dichev & Dicheva, 2017).

In their book "For the Win," Werbach & Hunter (2020) describe that "the great fun that comes from an extended interaction with well-designed games' is a 'special tool to address serious pursuits," including education. They do not hesitate to equate education and work with 'just games' and wonder, 'why not make better games?" (Werbach & Hunter, 2020). Previous studies showed that features of well-designed games resulted in higher motivation levels in people, ostensibly because participation in the games is better than monetary incentives (Werbach & Hunter, 2020).

Game Elements

The building blocks of gamification, called game elements, are (a) Points, (b) Badges, and (c) Leaderboards (PBL, in short) (Dichevaet al., 2015; Hamari et al., 2014). Points encourage people to collect more by channeling their efforts towards the desired behaviors. Badges are simply a manifestation of points in visual form. Finally, the leaderboards show the relative position of a participant against others. Thus, leaderboards can be a double-edged sword as they can motivate and demotivate others due to individual perceptions.

A "bird's eye view" of three gamification theories

Self-determination theory of motivation (SDT)

Self-determination theory (Ryan & Deci, 2000) consists of a fusion of three interrelated human needs, namely, autonomy, relatedness, and competence, which propel an individual to engage in an activity or not. In gamification, autonomy refers to a participant's choices among several levels of activities to compete in the activity. Relatedness fosters relationships among participants to enjoy and compete in the activity. The need for competence is met by the elements in gamification, such as points and badges. Incidentally, SDT has been the most popular and frequently used theoretical model in gamification research (Seaborn & Fels, 2015).

Flow Theory

Flow Theory was introduced by Mihaly Csikszentmihalyi in the 1970s (Csikszentmihalyi & Rathunde,1993). The theory is based on the research of examining people who did activities for pleasure, even when they were not rewarded with money or fame. Csikszentmihalyi's words, flow is "a state in which people are

so involved in an activity that nothing else seems to matter; the experience is so enjoyable that people will continue to do it even at great cost, for the sheer sake of doing it". Csikszentmihalyi (1993) considered artists, writers, athletes, chess masters, and surgeons - as individuals who engaged in desired activities. He discovered that enjoyment did not result from relaxing or living without stress, but their attention was entirely absorbed during these intense activities. He called this state 'flow' because, during his research, people illustrated their intense experiences using the metaphor of being carried by a current like a river flow. The participants were motivated by the quality of the experience during their engagement in their chosen activity. The flow experience came when the activity was problematic and involved risk. It usually stretched the person's capacity and provided a challenge to his/her skills. Flow theory is optimal for the best user experience (Csikszentmihalyi & Rathunde,1993).

According to Nakamura and Csikszentmihalyi (2002), flow is an experiential state that is characterized by the following aspects: (a) The individual is in a state of intense and focused concentration on what he or she is doing; (b) a merging of action and awareness takes place; (c) the individual experiences a loss of reflective self-consciousness; (d) the individual feels a deep sense of control; (e) the individual's temporal experience is distorted (hours seem to pass like seconds); (f) worries and ruminative thoughts disappear; and (g) the individual enters a state of autotelic motivation indicated by the fact that engagement in the activity is perceived as rewarding in and of itself.

Octalysis

Chou (2019), author of 'Actionable Gamification' and self-made consultant, defined the first framework called Octalysis in his book Actionable Gamification. Actionable Gamification is more than a business book. It touches on the art of game design, the psychology that drives confident choices, the science of interaction, and how they all interplay to create something more than the sum of its parts -- a game. While the book uses a few social media games, such as Farmville, to explain game elements, it also deliberates on the practical usage in the United States Armed Forces and Nike. The book explores numerous ways games can use human tendencies for better engagement and offers a comforting thought on the techniques to improve results.

Octalysis framework is human-centered and wired to drive human behavior. This human-focused framework took ten years in the making. It helped boost motivation and engagement with eight core drivers representing meaning, empowerment, social influence, unpredictability, avoidance, scarcity, ownership, and accomplishment (Chou, 2019, p.9).

Each of the drives analyzes the motivational factors for users. The Octalysis can reverse-engineer users' behavior to fulfill your business objectives. Octalysis framework continues to retain its novelty, as research or literature on date remains to be a handful.

Figure 1 Actionable Gamification by Chou, K. 2019

Note: Figure 1 is a synopsis of Chou's Actionable Gamification. The figure denotes the eight drives with examples.

Literature Review

Approach to literature review

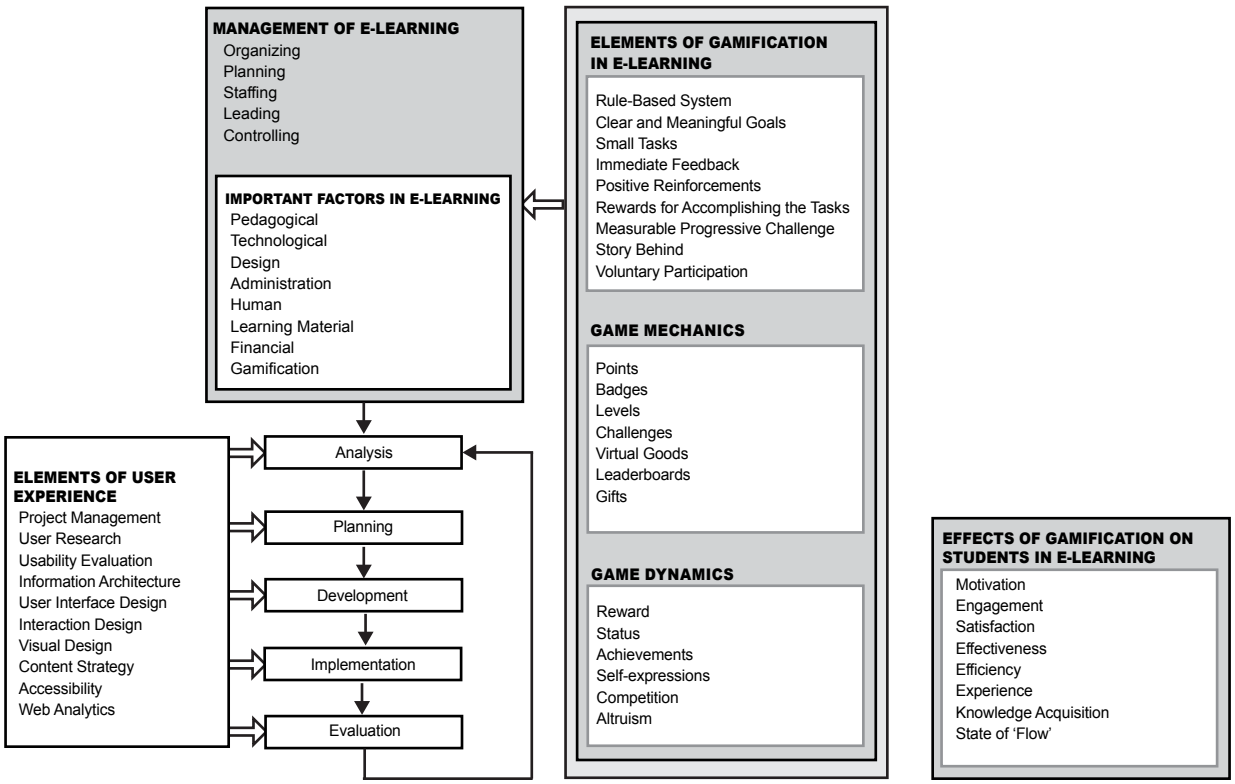
After an initial search of articles on gamification from Google Scholar and the research databases, relevant articles relating to gamification in higher education published from 2015 to 2020 were selected. This period showed considerable growth in research studies on the subject. Majority of the sixteen (16) articles selected for literature review related to the year 2020 (6), followed by 2019 (3), 2018 (4), 2016 (2), and 2015 (1).

Significant findings of the work done

Zainuddin et al. (2020) determined that "most studies were found to use a quantitative approach, followed by the mixed-methods approach," indicating the lack of in-depth investigations into the qualitative aspects of gamification in education. They further observed that their systematic review of empirical evidence covered the period from 2016-2019 from the Web of Science database was in line with two other similar reviews; (a) by Bozkurt et al. (2015) covering the period from 2009 to 2013 and (b) by Özyurt and Özyurt (2015: p. 69) covering the period from 2005-2014. While recommending the adoption of contemporary technologies by teachers, they concluded that "a good teaching strategy was that would make the students comfortable and ensure that they experience fun and enthusiasm while learning." Another systematic mapping study of fifty research papers covering the 2011-2016 period by Rodrigues et al. (2019) in the areas of education and business identified 'eight themes (gamification; game; use; users; business; points; engagement; learning) and twenty-eight related concepts' serving as guidelines for future research on gamification. In particular, the authors highly recommended using Leximancer software for content analysis in qualitative research.

Huang & Hew (2018) presented two quasi-experimental studies in flipped learning context based on a synthesized theoretical model called GAFCC (goal-access-feedback-challenge-collaboration), a fusion of five theoretical models, namely, flow, goal setting, social comparison, self-determination, and behavioral reinforcement. The studies involved forty postgraduate students from information technology and library science programs without prior

Figure 2 The model for the introduction of gamification into the field of e-learning.



Note: Figure 2 is a flowchart conceptualized by Urh et al. (2015).

experience in flipped learning or gamification. The GAFCCC class produced positive results regarding a higher completion rate of pre- and post-class activities in quantity and quality.

Aguiar-Castillo et al. (2020) analyzed the factors influencing the students' intention to use the 'HE Game App' gamified app. The results showed that hedonic and social benefits and students' attitudes towards learning influenced their intention to use the gamified app in face-to-face education. The study investigated the effect of gamified education on student achievement and their attitudes toward lessons. The pre and post-experimental design consisted of ninety-seven sophomores of elementary mathematics from a university. The results positively impacted both student achievement and their attitudes toward lessons. Further, though gamified teaching did not contribute to the student's cognitive levels, it provided more significant positive attitudes toward lessons.

Urh et al. (2015) recommended a conceptual model for eLearning by incorporating appropriate gamification elements, as presented in **Figure 2**. Apart from discussing the project management side of e-learning, they underscored the importance of personalizing the e-learning content to suit the learners' wants. This model consists of the main elements of management of e-learning, essential factors in e-learning, elements of user experience, phases of development (analysis, planning, development, implementation, and evaluation), game mechanics, game dynamics, gamification elements in e-learning, and their effects on students (Urh et al., 2015).

Bai et al. (2020) attempted a deep dive through meta-analysis on the impact of gamification on student learning. The analysis consisted of twenty-four quantitative and thirty-two qualitative studies with no publication bias found by the authors. While the meta-analysis of quantitative studies showed a moderately positive impact of gamification on learning outcomes, the qualitative studies explained the 'why' part of the impact (both positive and negative) of gamification. The reasons favoring gamification included enhanced enthusiasm, feedback on performance, recognition, and goal setting. The study, however, posed two unresolved questions: (a) the effectiveness of tangible rewards to users, and (b) the appropriate way to use leaderboards in educational contexts. While studying the meta-analysis impact of gamification, the authors took a neutral stance in the context of some severe criticism against gamification by Bogost (2011) and Toda et al. (2017). Bogost (2011) described Gamification to be a marketing "bullshit "invented by consultants to capture the wild, coveted beast that is videogames and to domesticate it for use in the grey, hopeless wasteland of big business, where "bullshit" already reigns anyway. Toda et al. (2017) cautioned against the superficial and shallow nature of implementing gamification resulting in possible adverse effects.

Van Roy & Zaman (2018 and 2019) conducted a quantitative study in 2018 and a qualitative study in 2019. Their quantitative study in 2018 consisted of forty university students over a 15 week-semester to assess the changes in motivation resulting from the interaction with the need supporting platform. It produced mixed results. An important finding was that personal characteristics could mediate between gamification and motivation. Their qualitative study in 2019 involved 120 individual surveys and two focus groups of university students at master's level courses over 15 weeks. Based on the psychological need satisfaction component of self-determination theory, the results showed mixed results of the impact of game elements on a gamified platform.

Kusuma et al. (2018) conducted a survey of thirty-three papers on gamification models across four disciplines, namely, generic, STEM (Science, Technology, Engineering, and Mathematics), history, and language, using the MDA (Mechanics, Dynamics, and Aesthetics) framework revealed that only some gamification models resulted in higher motivation, achievement, and engagement.

Putz et al. (2020) conducted a two-year longitudinal study of 617 secondary and tertiary students with various workshop designs revealing that improved workshop designs contributed to increased student knowledge retention. The study further reinforced the usefulness of gamification in learning environments.

Treiblmaier & Putz (2020) led gamified experimental workshops with 384 students in a field experiment that showed increased intrinsic motivation measured by enjoyment and curiosity. Thus, the authors concluded that gamification positively affected intrinsic motivation by amplifying it and moderating the external motivational factors.

Ntokos (2019) engaged the weak students by introducing appropriate game elements and found that the study produced positive results. The qualitative study concluded meaningful feedback from happy students that used the game elements in one unit. The author recommended more cycles to refine the framework and modify the components that did not work for students.

Hakak et al. (2019) predicted that gamification would likely replace traditional education, and the solution hinged on merging gamification with cloud computing. Despite its futuristic nature, the authors gave the readers a basic understanding of the required cloud architecture. A model incorporating the learning components of all subjects in a single application for ease of implementing the technology was provided.

Alexiou & Schippers (2018) revealed the complexity of integrating digital technologies into pedagogy by underscoring the roles of proximal goals, the inclusion of uncertainty, regular feedback, and adaptable challenge levels to sustain higher levels of the game player's engagement.

Taspinar et al. (2016) developed a board game as an instrument for the teachers with interactive and self-learning modes to use in blended learning. The teachers and the students reported a positive effect of motivation and fun on learning.

Legaki et al. (2020), through their study, conducted a gamified application called 'Horses for Courses' in Statistics subject in which 365 students from Engineering and Business disciplines participated. The results showed a positive impact on student learning compared to traditional methods. Further, the impact was more on female students from the Engineering discipline. The authors noted that the positive impact of gamification would be more when combined with traditional teaching methods. The results were in line with the other studies indicating the positive impact of gamification on learning outcomes.

Bennani et al. (2020) argued that gamification needs to be adaptive to the learners' personal and changing needs based on the premise that one size does not fit all. After analyzing educational and gamification ontologies, the authors proposed a representation of adaptive gamification domain knowledge into an ontology.

Gatti et al. (2019) conducted a pre and post-business game survey to evaluate student learning experience at two universities which showed that the action learning approach, particularly simulation and gaming, generated cognitive and effective learning outcomes.

Andrade et al. (2016) contended that, in contrast to the marketing perspective, the goal of gamification was to make the participants loyal to the system, not necessarily to enhance learning. Gamification was only good only if it was controlled. It could cause distraction in the form of relatedness-centric forums and charts that did not contribute to learning. Customization was yet another feature that promoted immersion but resulted in a waste of time without learning. Students could get addicted to the external incentive and concentrate less on learning. Gamification's overuse should be controlled by constantly monitoring users, systems, and gamification features.

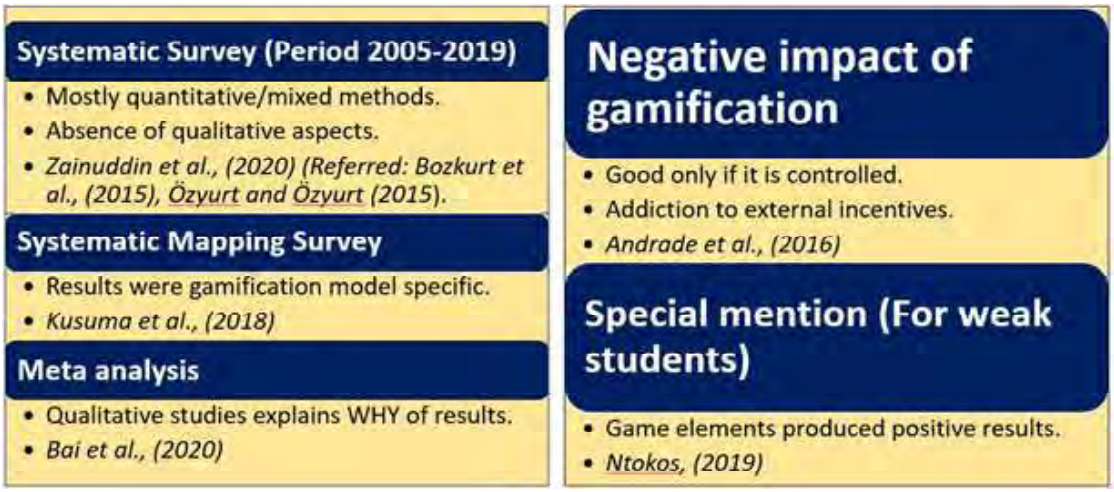
Synopsis of literature review

The studies mentioned above were based on mixed and quantitative methodologies. The standard theoretical framework among the studies was Self Determination Theory, followed by Flow theory by designing various combinations of game elements in different contexts with rewards (points, grades, or leaderboard). A majority of the studies concluded with mixed results with no substantial evidence on the intrinsic factors for the positive results on the impact of a user's motivation. Quantitative studies did not deliberate the 'state' of a user in depth. Qualitative research could have added more value to understanding the 'state' of a user. A key area least addressed was understanding the association between personal characteristics and motivation through game elements. Qualitative research findings would help establish a substantial inclusion and connection of the intrinsic motivators and game elements.

Gaps in literature and Future research focus are recommended in the literature.

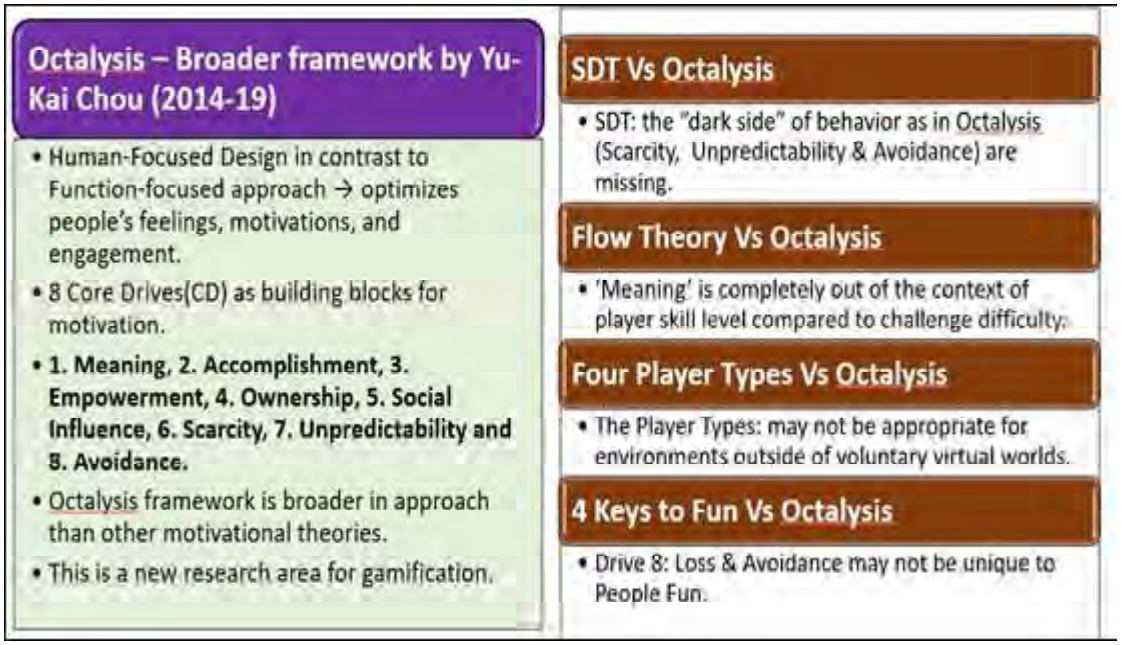
Zainuddin et al. (2020) found that ineffective gamified learning was due to game-based elements, instructional design, and technical factors. Further, over-incentivization resulted in a lack of intrinsic motivation for students to participate voluntarily in the learning process. Longitudinal studies across disciplines, time, and space, were recommended for future research Zainuddin et al.,

Figure 3 Overview of gaps in the literature



Note: **Figure 3** summarizes the gaps in the literature based on the systematic analysis of the research studies.

Figure 4 Components of Octalysis and its comparison with other theories.



Note: **Figure 4** shows the components of Octalysis and its comparison with other theories.

(2020). Systematic mapping studies could replicate with larger samples to determine predictive capabilities. (Rodrigues et al., 2019). Cultural differences in various countries should consider in future studies. Future studies should include skills other than memorization, such as mathematical, language, or social skills (Putz et al., 2020).

Conclusion

The overview of the gaps in the literature on gamification in higher education is shown in **Figure 3.**

The broader framework of Octalysis is a more human-focused design in contrast to the function-focused approach of other theories, optimizing people's feelings, motivations, and engagement.

From the above, in **Figure 4**, it is evident that the Octalysis framework seems to be better suited to the application of gamification in higher education. The uniqueness of the Octalysis framework is the eight core elements, and Chou (2019) believes that different game techniques push users forward differently. Based on Chou's work on the eight drivers, the framework can be synonyms with the business model of Agile Methodology. The Octalysis framework can be customized to fit the users' perspective and feedback - the more customization, the better the motivational impact of the end users. As a new concept, research in this area is nascent and holds much promise in the future.

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