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GAMIFICATION IN EDUCATIONAL SPACE: A SYSTEMATIC REVIEW

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ABSTRACT

The study looked at papers on gamification from 2015, with the main spotlight on Dicheva, Dichev, & Agre. The paper identified 28 papers and special references given to Ryan & Deci, Deterding, et al., and Mora, et al. The review discussed the questions raised by Dicheva et al., Dichev & Dicheva (1) What educational context has gamification been applied to? (2) What game elements have been used to gamify the lessons? and the gap raised by Ofosu-Ampong (3) What is the role of motivation in gamification? The review also discovered that the use of gaming elements in education has a greater impact on academic performance with points, leaderboards, and badges being the most used gaming elements in gamification in education practice. Also, on the subject of motivation which the review sought to understand its role in the process of gamification, it is evident to understand that, the concept of gamification itself in technical wise a motivational design problem. The review concluded that research in education is unending, as such future research should look at specific gaming elements with their efficacy in an educational context.

Keywords: Gamification, Motivation, Self-determination theory, gameful experience, game elements

INTRODUCTION

As an emerging technology, gamification has found space in health, training, marketing, human resource, environmental protection, crowdsourcing, human well-being, and education (Dichev & Dicheva, 2017, Jarnac de Freitas & Mira da Silva, 2020). The thought of gamification for education has drawn in many academicians as it addresses the increasing concerns about engagement and motivation in the current technologically advanced times (Imran, 2019) as it has become one key sector where gamification has been explored (Dichev & Dicheva, 2017). The rapid rise of gamification literature in academics started around 2011 and 35.4% of empirical and 46.7% of non-empirical reviews (Koivisto & Hamari, 2019). The term since its inception to stimulate motivation, behavioral alterations, friendly competition, and cooperation in different settings, such as customer engagement, employee performance, social loyalty, and education (Dichev & Dicheva, 2017) in the areas as described by Dichev & Dicheva (2017); Jarnac de Freitas & Mira da Silva (2020), has been defined as the sensation of creating gameful experiences. Gamification is the utilization of game features, chiefly video game elements, in a non-game scenario for the purpose of promoting motivation and engagement in learning (Alsawaier, 2018). The focus of the former defining gamification was to define games as having the tendency to free learners from the traditional pedagogies and to free their interest for engagement and interest. Kapp (2013) as cited in (Alsawaier, 2018), defines gamification as the application of game-based mechanics, aesthetics, and thinking to motivate people, and engage action to solve problems. Gamification is the application of game design constituents in non-game settings to engage participants and encourage desired behaviors (Rahman , Ahmad, & Rabaah , 2018). Among all the definitions, the most widely used is that of Deterding, *et al*., (2011) as conceded by (Murillo-Zamorano & Muñoz, 2021). Deterding, *et al*., (2011), defines gamification as the application of game design components in a non-game context (Deterding, *et al*., (2011).

Table 1. Tabular Explanations of Gamification by Different Authors

Author(S)	Definition
deterding *et al*, (2011)	Gamification is the application of game elements in a non-game context.
Kapp (2013)	Gamification is the use of game-based mechanics, aesthetics, and thinking to motivate and engage people.
rahman *et al*, (2018)	Gamification is the use of game design components in non-game setting to augment desired behaviors.
werbach (2014)	Gamification is the process of making activities more game-like.
hamari *et al*, (2019)	Gamification is the process of creating sensational gameful experience.

The concept of gamification has been adopted into all spaces of human development with the aim of shaping behavior in the right direction (Dicheva, Dichev, & Agre, 2015). The purpose of gamification is its promising capacity of inciting motivation and engagement (Imran,

2019). In education, which is of interest to the review, gamification denotes the use of gameful features and gameful experiences in the planning of the learning process (Dichev & Dicheva, 2017). Traditional methods of pedagogy have a central problem of conflicting the interest and engagement of learners (Smith *et al*, 2005 as cited in Pesare, Roselli, Corriero, & Rossano, 2016). To curb this problem to increase the interest and engagement of the learners, it is imperative to adapt a technological, innovative program that would buffet the problem of disengagement. The adaption and use of gamification as a pedagogical tool provide some panacea for many students who find themselves estranged from the traditional method of schooling (Alsawaier, 2018). The purpose of gamification is a matter of adding features as seen in games in learning to create injection as that found in games.

The concept of gamification has become a key area in educational research (Dichev & Dicheva, 2017, Martí-Parreño, Méndez-Ibáñezt, & Alonso-Arroyo, 2016) as researchers have been writing extensively on the subject in relation to education to addressing the key developments and progress the methodology is taking. Such writings are evident in (Dicheva, Dichev, & Agre, 2015, Ofosu-Ampong, 2020, and Dichev & Dicheva, 2017). Though there have been constant visits to tackle the developmental issues connected to the use of gaming elements to augment the process of learning, these highlights would not have longer-lasting solutions to addressing the perpetual needs of the technology. In the highlights of Ofosu-Ampong (2020), he recommended in addressing the impact of gamification on learners, it is imperative to introduce moderating and mediating factors such as motivation. Dichev & Dicheva (2017) posits majority of reviewed papers analyze specific educational effects of gamification, the focus is often shifted from motivation. These gaps identified by the researchers keep evolving into new forms as the new developments would constantly create new gaps. The focus of this article reviews of the present state of gamification in connection with education taking into consideration the issues of motivation. Reviews are relevant to the development and learning of gamification, especially in progressing our knowledge, propounding theories, and unearthing new areas of research (Webster & Watson, 2002 as cited in Ofosu-Ampong, 2020).

The focus of the research is to comprehend gamification research in education as conceded also by (Ofosu-Ampong, 2020). Gamification has become a new area of technology that increases engagement and interest, especially in education to foster problem-solving skills and promote desirable behaviors (Zichermann & Cunningham, 2011). Deterding, Dixon, Khaled, & Nackle (2011) admits there are varieties of research questions regarding gamification in education. The main research questions for the review are adopted from the highlights (Dicheva, Dichev, Agre, 2015, Dicheva, Dichev, 2017) and further added. The research questions are:

1. What educational context has gamification been applied to?
2. What game elements have been used to gamify the lessons?
3. What is the role of motivation in gamification?

METHODOLOGY

The selection standard was based on the PRISMA statement (Moher, Liberati, Tetzlaff, & Altman, 2009). The research focused on mapping existing literature on gamification in the field of education. The search span was from the year 2015 to 2021 and special preference given to (Ryan & Deci , 2000), (Deterding, Dixon, Khaled, & Nackle, 2011), and (Mora, Riera, González, & Arnedo-

Moreno, 2015). For this research, the researcher developed a search strategy to identify relevant kinds of literature, and the search was directed to these databases: WILEY, SAGE, ELSEVIER, TAYLOR and FRANCIS, EMERALD with the following descriptors, "GAMIFICATION", "GAMIFICATION and EDUCATION", "GAMIFICATION and MOTIVATION". The works of literature included journal articles and book chapters. The methodology used made it feasible to select download and select papers relevant to this review. The initial search results gave the researcher 232 papers which were later scaled down to 63 after careful reading of the abstract to delete those which were not relevant to education and duplicates. After further scrutiny of the remaining papers were scaled down to 28 which focused on the main highlights of (Dicheva *et al,* 2015) and on motivation.

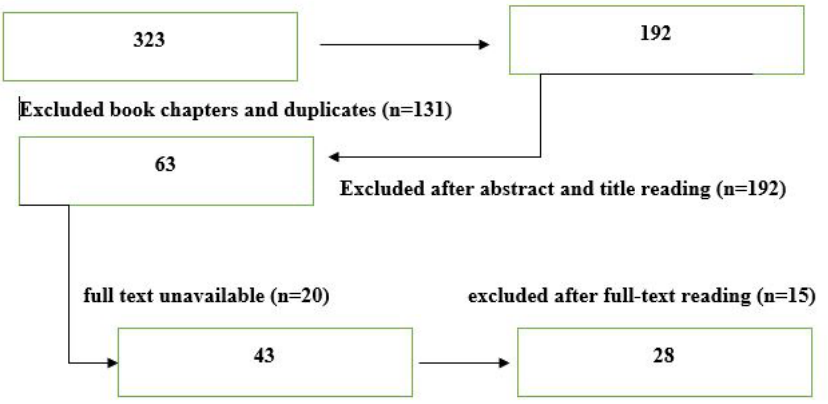

Fig 1. Screening Process in a flow diagram

Table 2. Journal Selection

Journal	Number	Article/Chapter
sage	3	Ofosu-Ampong, 2020, (Gunduz & Akkoyunlu, 2020), (Cakıroglu & Guler, 2021)
taylor and francis	1	(Buckley & Doyle, 2016), (Martí-Parreño, Galbis-Córdova , & Currás-Pérez, 2021), (Yıldırım & Şen, 2019), (Xiaoqing Ma, 2021)
emerald	1	(Alsawaier, 2018),
wiley	6	(Ortiz-Rojas, Chiluiza, & Valcke, 2019), (Jurgelaitis, Čeponienė, Čeponis, & Drungilas, 2018), (Isabelle, 2020), (Tantawi, Sadaf , & AlHumaid, 2016), (Guay, 2016), (Hu, Shewokis, & Fung, 2016)

elsEvier	6	(Yildiz, Topcu, & Kaymakci, 2021), (Krath, Schurmann, & Korflesch, 2021), (Xu, *et al*., 2021), (Bai, Hew, Sailer, & Jia, 2021), (Treiblmaier & Putz, 2020), , (Roy & Zaman, 2018)
SPRINGER	8	Rahman , Ahmad, & Rabaah , 2018), (Dicheva , Dichev , & Agre, 2015),(Dicheva , Dichev , 2017), (Imran, 2019), , (Pesare , Roselli , Corriero , & Rossano, 2016), (Murillo-Zamorano, Sánchez, Godoy-Caballero, & Muñoz, 2021), Smiderle, Rigo, Marques, Coelho, & Jaques, 2020), (Toda, *et al*., 2019).

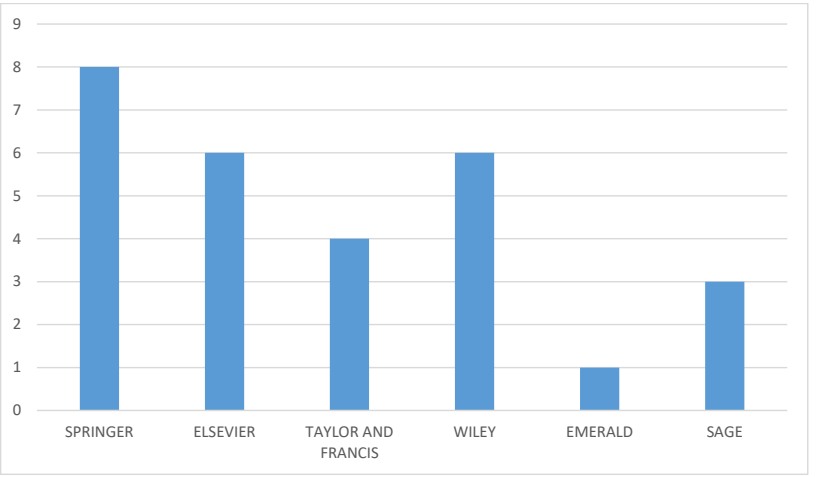

Fig 1. Graphical presentation of Journal Selection

Data Extraction

A literature survey consistently utilizes a framework for building the measure of the works in an intended area. This framework apprehends the potential properties of interest and establishes a relationship of the surveyed works and draws meaningful conclusions. The use of gamification in learning involves a number of aspects, including game features, educational setting, learning achievements, learner statistics, and the gamified scope (Dicheva, Dichev, 2017) and further adding the motivational affordances that gamification provides to incite the interest of learners within a learning space.

Review of Empirical Data

The results of the review are presented in the space within the research questions to provide a systematic dictation of facts. The results follow the order as presented below:

What educational level is targeted?

For the purpose of the study space and the number of articles and book chapters the research reviewed, the following numbers were observed as to the levels of education gamification has been explored over the period within the research restrictions (2016-2021).

Table 3. Educational Level Distribution

Level	Number	Author(S)
Higher Education	16	(Smiderle, Rigo, Marques, Coelho, & Jaques, 2020), (Buckley & Doyle, 2016), (Rahman , Ahmad, & Rabaah , 2018), (Murillo-Zamorano, Sánchez, Godoy-Caballero, & Muñoz, 2021), (Martí-Parreño, Galbis-Córdova , & Currás-Pérez, 2021), (Ortiz-Rojas, Chiluiza, & Valcke, 2019), (Jurgelaitis, Čeponienė, Čeponis, & Drungilas, 2018), (Isabelle, 2020), (Tantawi, Sadaf , & AlHumaid, 2016), (Pesare , Roselli , Corriero , & Rossano, 2016), (Imran, 2019), (Yildiz, Topcu, & Kaymakci, 2021), (Bai, Hew, Sailer, & Jia, 2021), (Aguiar-Castillo, Hernandez-Lopez, Saa-Perez, & Perez-Jimenez, 2020), (Roy & Zaman, 2018)
secondary education	1	(Treiblmaier & Putz, 2020)
general education	1	(Gunduz & Akkoyunlu, 2020)
lower grade	1	(Cakıroglu & Guler, 2021)

Most of the research done on the subject of education has been done in higher education as the works of literature sourced affirms that effect. Dicheva & Dichev (2017), admits the possible explanation for this may be the possibility of easily experimenting with gamification in higher education courses as compared to other levels of human learning institutions. Learners in higher education have the necessary technical skill and computer adaptability which supports most gamified learning spaces.

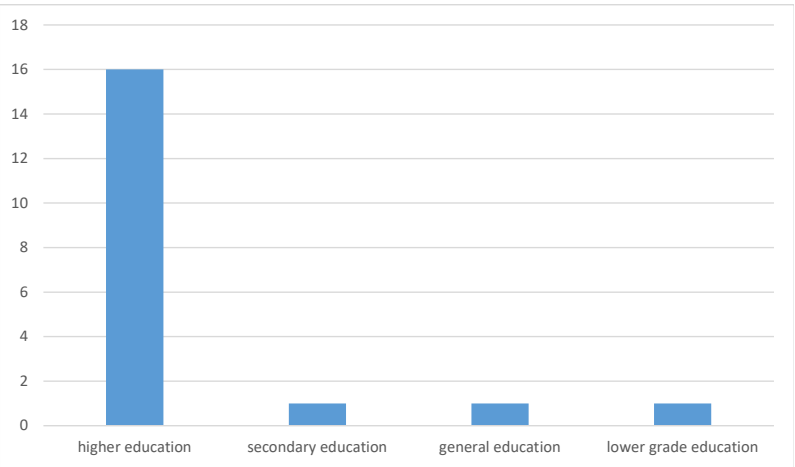

Fig 2. Graphical distribution of Educational Level

Which learning subjects are gamified?

Table 4. Subject Target

Subject	Number	Author(S)
Information Technology & Computer Science	8	(Rahman , Ahmad, & Rabaah , 2018), (Imran, 2019), (Smiderle, Rigo, Marques, Coelho, & Jaques, 2020), (Bai, Hew, Sailer, & Jia, 2021), (Roy & Zaman, 2018), (Ortiz-Rojas, Chiluiza, & Valcke, 2019), (Jurgelaitis, Čeponienė, Čeponis, & Drungilas, 2018), (Buckley & Doyle, 2016),
Medicine	2	(Pesare , Roselli , Corriero , & Rossano, 2016), (Tantawi, Sadaf , & AlHumaid, 2016)
Business	2	(Murillo-Zamorano, Sánchez, Godoy-Caballero, & Muñoz, 2021), (Treiblmaier & Putz, 2020), (Isabelle, 2020),
Tourism	1	(Aguiar-Castillo, Hernandez-Lopez, Saa-Perez, & Perez-Jimenez, 2020),
Language	1	(Toda, *et al*., 2019).

A chunk of research has been done within the space of IT and CS as put alongside other areas of education in this study. The same result was recorded in Dicheva & Dichev (2017). The overwhelming difference between the numbers of CS/IT and other subjects in the application of games could be that they are more suitable subjects to implement gamification but such pieces of evidence are not substantiated.

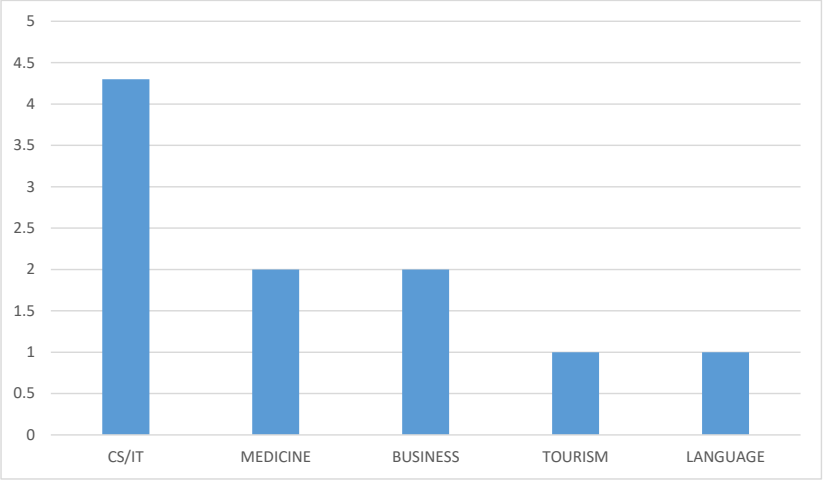

Fig 3. Graphical Distribution of Subject Target

What is the impact of gamification on learning?

Table 5. Impact of Gamification

Author(S)	Effect
Rahman, Ahmad, & Rabaah (2018)	Successful
Imran (2019)	
Pesare, Roselli, Corriero, & Rossano (2016)	Successful
Murillo-Zamorano, Sánchez, Godoy-Caballero, & Muñoz, (2021)	Successful
Smiderle, Rigo, Marques, Coelho, & Jaques (2020)	Mixed
Ortiz-Rojas, Chiluiza, & Valcke (2019)	Successful
Jurgelaitis, Čeponienė, Čeponis, & Drungilas (2018)	Successful
Isabelle (2020)	Successful
Tantawi, Sadaf , & AlHumaid, (2016)	Successful
Buckley & Doyle (2016)	Successful
Martí-Parreño, Galbis-Córdova & Currás-Pérez (2021)	Successful
Yildiz, Topcu, & Kaymakci (2021)	Successful
Bai, Hew, Sailer, & Jia (2021)	Successful
Treiblmaier & Putz (2020)	Successful
Gunduz & Akkoyunlu (2020)	Successful
Cakıroglu & Guler (2021)	Successful

Fig 4. Graphical Presentation of Gamification Impact

The data set presents a number of positives outcomes to the application of gamification in education which is line with the results of (Yıldırım & Şen, 2019). It is imperative to understand that in the literature, the results from the research do not only reveal gamification affecting academics or specific subjects only (Murillo-Zamorano *et al*., 2021; Ortiz-Rojas, Chiluiza, & Valcke, 2019; Jurgelaitis *et al*., 2018; Isabelle, 2020; Tantawi, Sadaf, & AlHumaid, 2016; Martí-Parreño, Galbis-Córdova , & Currás-Pérez, 2021; Gunduz & Akkoyunlu, 2020; Gunduz & Akkoyunlu, 2020) but gamification was also used in the process of testing its motivational powers and how it is able to increase motivation and engagement in learners (Rahman, Ahmad, & Rabaah , 2018; Imran, 2019; Pesare *et al*., 2016; Yildiz, Topcu, & Kaymakci, 2021; Bai, Hew, Sailer & Jia, 2021; Treiblmaier & Putz, 2020; Aguiar-Castillo *et al*., 2020). In other literature, the results obtained were specified as mixed as the outcome of gamification on learning and engagement was positive and negative depending on their personality traits (Smiderle *et al*., 2020; Buckley & Doyle, 2016).

Which game elements have been used?

Gamification is the application of game design elements in a non-game setting to stimulate desired behaviors (Rahman *et al*, 2018). According to (Werbach & Hunter, 2012), the elements for gamification can be grouped into three, namely: dynamics: correspond to the highest imaginary level in a gamified system. It sums up constraints, emotions, narrative,

progression, and relationships (Dichev & Dicheva, 2017), mechanics: the activities used to drive the users' actions and are staged through the components (Toda, *et al*., 2019). Examples include challenges, chance, competition, cooperation, feedback, resource acquisition, and rewards, Components: refer to external rewards and feedback features like points, badges, leaderboards, etc. It is evident that most of the educational studies on gamification are presumptuous about the use of game elements within the learning process (Dichev & Dicheva, 2017). The number and types of elements constructed from 15 out of the 25 of the literature encountered which provided specific types of elements used are presented in a tabular form.

Table 6. Gamification Elements Used by Authors

Element	Number	Author(S)
Points	1	Rahman , Ahmad, & Rabaah (2018)
Badge	1	Imran (2019)
Points, Ranks, Reward	3	Pesare , Roselli , Corriero , & Rossano (2016)
Leaderboards, Badges	2	Murillo-Zamorano, Sánchez, Godoy-Caballero, & Muñoz, (2021)
Leaderboards	1	Ortiz-Rojas, Chiluiza, & Valcke (2019)
Ranks, Points, Badges	3	Smiderle, Rigo, Marques, Coelho, & Jaques (2020)
Points, Leaderboards, Badges	3	Jurgelaitis, Čeponienė, Čeponis, & Drungilas (2018)
Leaderboard	1	Isabelle (2020)
Leaderboard, Points, Storytelling, Feedback	4	Tantawi, Sadaf, & AlHumaid (2016)
Reward, Virtual Cash, Feedback, Rank, Leaderboard	5	Buckley & Doyle (2016)
Ranks, Points	2	Yildiz, Topcu, & Kaymakci, (2021)
Leaderboard	1	Bai, Hew, Sailer, & Jia, (2021)
Points, Badge	2	Treiblmaier & Putz (2020)
Points, Levels, Badges	3	Gunduz & Akkoyunlu (2020)
Badges, Leaderboards, Real Gifts	3	Cakıroglu & Guler (2021)

Analyses from the table of elements used by the different authors in the research suggest that, a number of researchers preferred to use points, leaderboards and badges as elements to satisfy their gamification research needs.

Table 7. Number of Elements Used

Gamification Element	Number
Reward	2
Badge	7
Point	8
Leaderboard	8
Rank	4
Storytelling	1
Feedback	2
Virtual Goods	1
Real Gift	1

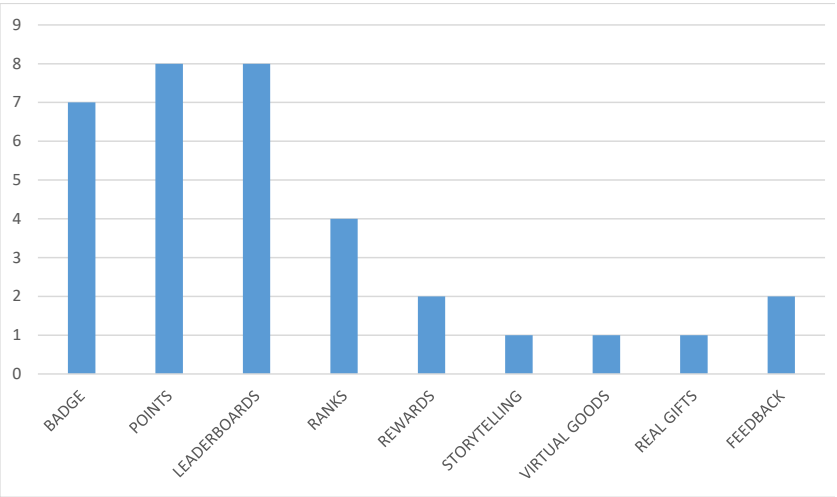

Fig 5. Graphical presentation of Elements used

What are the motivational affordances for gamification?

Motivation is explained as the passion and activity towards a goal-oriented behavior (Hu, Shewokis, & Fung, 2016). In other terms, the psychological concept has been defined as an activity that gives behavior purpose and direction. The focus of motivation in every wise is geared towards leading the action of the motivatee in the right direction. In learning situations, motivation act as a catalyst in the positive development of the learner. Students are highly motivated because they would want to get good grades or they would want to outscore their peers in a test. Based on the assumptions of student motivation already established, student motivation can be grouped into two domains, which are intrinsic motivation; the desire to achieve something only because one has an interest in them. Amabile (1996), as cited in (Xiaoqing Ma, 2021) when driven by intrinsic motivation, individuals are able to find tasks interesting and are more poised to take risks and break traditions. However, the concept of intrinsic motivation is not only the essential factor in developing the creativity of students, but it may need other external factors (Xiaoqing Ma, 2021) and extrinsic motivation; the desire for something because in the end, something would come out from the activity. Students' high level of motivation is mostly not based on intrapersonal factors only, but on the capacity of the learners to build their own competencies (Guay, 2016). Most researchers use different frameworks of thinking about motivation and motivational learning. For example, John Keller's theory of motivation was centered on the ARCS thus acceptance, relevance, concentration, and satisfaction (Hu,

Shewokis, & Fung, 2016). Other frameworks have been designed by different authors, which in the end looks at having the learner motivated. For example, the model of (Ryan & Deci , 2000).

Connecting Motivation to Theories of Gamification

Gamification is the application of gaming elements in a non-game situation (Deterding, Dixon, Khaled, & Nackle, 2011). The purpose of gamification is not solely the fun (Mora, Riera, González, & Arnedo-Moreno, 2015) aspect but to incite interest and motivate participants in the gamified environment (Kapp, 2013). Most of the theories surrounding gamification are guided by intrinsic motivation and the most common theory used in gamification research is based on the Self Determination Theory (Ofosu-Ampong, 2020) as (Murillo-Zamorano & Muñoz, 2021) posits from Di Tomasso (2011), as a framework for success is based on SDT by Ryan and Deci (2000).

Self-Determination Theory (SDT)

Motivation and engagement sum up to be the heart of the self-determination theory of human motivation by Ryan and Deci (Alsawaier, 2018). The SDT adopts an organismic meta-theory that projects the essence of human metamorphized inner resources for personality development and emotional regulation. The focus of the SDT, investigate people's inborn growth capacities and the psychological needs which are the core for their self-motivation and personality integration (Ryan & Deci , 2000). The focus of the theory is built on three needs of humans which are competence; motivation to overcome challenges and achieve success, autonomy; decision making, and responsible for one's own actions, the last of the needs is relatedness; social status, mutual respect, and interdependence. Gee (2003) as cited in (Alsawaier, 2018), posits many players engaged in a gamified environment would want to make their own choices and would want to compete on (competence) and upon their own acceptance to join the fun choose their own avatars (autonomy). In the course of the competition, people are placed on leaderboards to show their stance in the gamified environment (relatedness). The purpose of the SDT elements is to positively affect the intrinsic motivation of human motivation (Alsawaier, 2018). The concept of the SDT has a direct representation of the dimensions of motivation as designed by (Ryan & Deci , 2000). The dimensions of competence, autonomy, and relatedness form the heart of the Self Determination Theory.

Table 8. Motivation Dimensions, Indicators and Hypothesis

Dimension	Indicator	Motivation Hypothesis
Competence	Learners have the ability to complete a task	Intrinsic
Autonomy	Choice-making and being responsible for one's decision.	Intrinsic
Value	Learners have interest and see value in a task.	Intrinsic
Relatedness	Social status upon completing a task	Extrinsic

In this review, the focus is not to look at the number of papers that reported on the role of motivation and how it affected the gamified learning process only but to analyze the mediating role of motivation in a gamified learning environment. The focus

of gamification in education is to trigger the interest of learners and motivate learners. However, as to how the psychological construct of motivation relates gamification has not been looked at. Gamification has been constructed to ignite the intrinsic motivation of learners thus competing, making decisions, and attributing value to the learning task. These aforementioned factors are the direct focus of motivation, especially in learning. In a gamified environment, learners choose to compete (intrinsic motivation) and in the end await to be placed on a status (extrinsic motivation). In the review of papers, authors reported on the use of gaming elements which had the heart of the SDT and the dimension of motivation.

Example of Reports on Gamification Based on the Dimensions of Self-Determination Theory of Human Motivation

In the report of (Jurgelaitis, Čeponienė, Čeponis, & Drungilas, 2018), the motivation level of learners was improved which had an impact on the learning of students. Although the studies didn't specifically highlight the theory of motivation used, the intervention used on Moodle platform had the elements of the SDT (competence, autonomy, relatedness) like the studies (Buckley & Doyle, 2016) prediction market intervention, (Ortiz-Rojas, Chiluiza, & Valcke, 2019) also adopted the Werbach and Hunter's concept of mechanics, dynamics; which looks at the curiosity and components to design their game environment in STEM studies. These three elements by Hunter and Werbach are in disguise built on the SDT. Almost all the papers reported on with regards to this review were not specific with the theory of motivation used and to relate it to the self-determination theory, but it is evident in the reports by the various authors that the elements used for the various works had the components of the SDT as reported above.

Table 9. Gamified and SDT Structure Theory

Author	Gamified Content	Theoretical Structure Based on Sdt
Buckley & Doyle (2016)	Predictive marketing	Group decision- autonomy competition-competence, leaderboard-relatedness
Ortiz-Rojas, Chiluiza, & Valcke (2019)	Computer programming	Dynamics- autonomy, mechanics-competence, components-relatedness
Jurgelaitis, Čeponienė, Čeponis, & Drungilas (2018)	Unified modelling language	Points- competence Leaderboard- relatedness

CONCLUSION

The purpose of gamification in education is to encourage learner's motivation and encouragement by adopting gaming elements in a learning environment (Dichev & Dicheva, 2017). In the field of education many students have for long time been alienated from the school system (Alsawaier, 2018) as their levels of motivation and engagement have not been considered. However, the introduction of gamification as pedagogical strategy has managed to increase the engagement and motivation of learners thereby increasing academic performance in the areas of education they have been applied.

The focus of this review was to analyze papers from 2015-2021 and special reference to (Ryan & Deci , 2000), on the stance of gamification in education, taking into consideration the educational context gamification has been used, the impact of gamification in education, the gaming elements which have been used to gamify lessons and the role of motivation in education. However, after a critical review of the papers, it was obvious to know that, gamification in education has become one of the key sectors in research. The review also discovered that, the use of gaming elements in education has a greater impact on academic performance with points, leaderboards, and badges being the most used gaming elements in gamification in education practice. Though the aforementioned gaming elements are mostly used and other elements, none of the papers were able to give a clear roadmap as to which gaming elements are most suitable and appropriate for which educational program. All the elements used were based on trials to see their efficacy.

On the subject of motivation which the review sought to understand its role in the process of gamification, it is evident to understand that, the concept of gamification itself in technical wise is a motivational design problem. Most of the theories supporting gamification are grounded on the elements associated with gamification or embedded in gamification. For example, the self-determination theory which has three major components of competence, autonomy and relatedness are associated to mechanics, dynamics and components of gamification. Though (Dichev & Dicheva, 2017), see many of papers focusing on effects of gamification and neglecting motivation could be as a result of authors having the difficulty in creating a distinction between gamification and motivation. Almost, all the elements used in gamification, thus mechanics, dynamics, and components are the body of motivation.

Research Gap

In future research on gamification in education, specific gaming elements should be researched into with their efficacy in a specific educational context. The focus of research in education is an unending event, therefore further research should be made into gamification in education making consideration for the learning environment where the gamification intervention would be implemented.

CONFLICT OF INTEREST

The researcher declares no conflict of interest.

REFERENCES

Aguiar-Castillo, L., Hernández-López, L., Saa-Perez, P.D., & Pérez-Jiménez, R. (2020). Gamification as a motivation strategy for higher education students in tourism face-to-face learning. Journal of Hospitality Leisure Sport & Tourism Education, 27, 100267.

Alsawaier, R.S. (2018), "The effect of gamification on motivation and engagement", International Journal of Information and Learning Technology, Vol. 35 No. 1, pp. 56-79. https://doi.org/10.1108/IJILT-02-2017-0009

Bai, S., Hew, F. K., Sailer, M., & Jia, C. (2021). From top to bottom: How positions on different types of leaderboard may affect fully online student learning performance, intrisic motivation, and course engagement. Computers & Education, Vol. 173, pp. doi.org/10.1016/j.compedu.2021.104297

Buckley, P., & Doyle, E. (2014). Gamification and student motivation. Interactive Learning Environments, 24(6), 1162–1175. https://doi.org/10.1080/10494820.2014.964263

Çakıroğlu, Ü., & Güler, M. (2021). Enhancing statistical literacy skills through real life activities enriched with gamification

elements: An experimental study. E-Learning and Digital Media, 18(5), 441-459. https://doi.org/10.1177/2042753020987016

Deterding, S., Dixon, D., Khaled, R., & Nacke, L (2011). From Game Design Elements to Gamefulness: Defining Gamification. In Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments (pp. 9-15). ACM. https://doi.org/10.1145/2181037.2181040

Dichev, C., and Dicheva, D. (2017) Gamifying education: what is known, what is believed and what remains uncertain: a critical review. Int J Educ Technol High Educ 14, 9. https://doi.org/10.1186/s41239-017-0042-5

Dicheva, D., Dichev, C., Agre G,. & Angelova, G. (2015). Gamification in Education: A Systematic Mapping Study. Journal of Educational Technology & Society, 18(3), 75–88. http://www.jstor.org/stable/jeductechsoci.18.3.75

El Tantawi, M., Sadaf, S. and AlHumaid, J. (2018), Using gamification to develop academic writing skills in dental undergraduate students. Eur J Dent Educ, 22: 15-22. https://doi.org/10.1111/eje.12238

Gee J.P. (2003). What video games have to teach us about learning and literacy. Comput. Entertain. 1, 1 (October 2003), 20. https://doi.org/10.1145/950566.950595

Guay F. (2016) The virtue of culture in understanding motivation at school: Commentary on the special issue on culture and motivation. Br J Educ Psychol. 86(1):154-60. doi: 10.1111/bjep.12105. Epub 2016 Jan 3. PMID: 26730442.

Gündüz, A. Y., & Akkoyunlu, B. (2020). Effectiveness of Gamification in Flipped Learning. Sage Open, 10(4). https://doi.org/10.1177/2158244020979837

Hamari, J.Koivisto, J. & Sarsa, H. (2014) "Does Gamification Work? -- A Literature Review of Empirical Studies on Gamification," 47th Hawaii International Conference on System Sciences, Waikoloa, HI, USA, 2014, pp. 3025-3034, doi: 10.1109/HICSS.2014.377 https://doi.org/10.1080/14703297.2019.1683464.

Hu A, Shewokis PA, Ting K, Fung K. (2016). Motivation in computer-assisted instruction. Laryngoscope. Aug;126 Suppl 6: S5-S13. doi:10.1002/lary.26040

Imran, H. (2019). Evaluation of awarding badges on Student's engagement in Gamified e-learning systems. Smart Learn. Environ. 6, 17. https://doi.org/10.1186/s40561-019-0093-2

Isabelle, D. A. (2020). Gamification of Entrepreneurship Education. Ottawa: Decision Sciences 18(2) pp. 203-223

Jarnac de Freitas, M., & Mira da Silva, M. (2020). Systematic literature review about gamification in MOOCs. Open Learning: The Journal of Open, Distance and e-Learning, 38(1), 73–95. https://doi.org/10.1080/02680513.2020.1798221

Jurgelaitis, M., Čeponienė, L., Ceponis, J., & Drungilas, V. (2018). Implementing gamification in a university-level UML modeling course: A case study. Computer Applications in Engineering Education, 27, 332 - 343.

Kapp, K. M. (2013). The gamification of learning and instruction Fieldbook: Ideas into practice. John Wiley & Sons.

Koivisto, J. & Hamari, J, (2019). "The rise of motivational information systems: A review of gamification research," International Journal of Information Management, Elsevier, vol. 45(C), pages 191-210.

Krath, J., Schürmann, L., & von Korflesch, H. F. O. (2021). Revealing the theoretical

basis of gamification: A systematic review and analysis of theory in research on gamification, serious games and game-based learning. Computers in Human Behavior, 125, Article 106963. https://doi.org/10.1016/j.chb.2021.106963

Ma, X., Bie, Z., Li, C., Gu, C., Li, Q., Tan, Y., Tian, M., & Fan, C. (2021). The effect of intrinsic motivation and environmental cues on social creativity. Interactive Learning Environments. Advance online publication. https://doi.org/10.1080/10494820.2021.1874423

Martí-Parreño, J., Galbis-Córdova, A. and Currás-Pérez, R., (2021). Teachers' beliefs about gamification and competencies development: A concept mapping approach. Innovations in Education and Teaching International, 58(1), pp.84–94.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. BMJ (Clinical research ed.), 339, b2535. https://doi.org/10.1136/bmj.b2535

Mora, A., Riera, D., González-González, C.S., & 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), 1-8.

Murillo-Zamorano, L.R., López Sánchez, J.Á., Godoy-Caballero,A.L. (2021). Gamification and active learning in higher education: is it possible to match digital society, academia and students' interests? Int J Educ Technol High Educ 18 (15) https://doi.org/10.1186/s41239-021-00249-y

Ofosu-Ampong, K. (2020). The Shift to Gamification in Education: A Review on Dominant Issues. Journal of Educational Technology Systems, 49, 113 - 137.

Ortiz-Rojas M, Chiluiza K, Valcke M. (2019) Gamification through leaderboards: An empirical study in engineering education. Comput Appl Eng Educ. 27: 777-788. https://doi.org/10.1002/cae.12116

Pesare, E., Roselli, T., Corriero, N. (2016). Game-based learning and Gamification to promote engagement and motivation in medical learning contexts. Smart Learn. Environ. 3, 5 https://doi.org/10.1186/s40561-016-0028-0

Putz, L.-M., & Treiblmaier, H. (2020). Gamification as a moderator for the impact of intrinsic motivation: Findings from a multigroup field experiment. Learning and Motivation, 71(101655), Article 101655. https://doi.org/10.1016/j.lmot.2020.101655

Rahman, Ab, R., Ahmad, S. & Hashim, U.R. (2018). The effectiveness of gamification technique for higher education students engagement in polytechnic Muadzam Shah Pahang, Malaysia. Int J Educ Technol High Educ 15, 41 https://doi.org/10.1186/s41239-018-0123-0

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. American Psychologist, 55(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Smiderle, R., Rigo, S.J., Marques, L.B.(2020). The impact of gamification on students' learning, engagement and behavior based on their personality traits. Smart Learn. Environ. 7, 3. https://doi.org/10.1186/s40561-019-0098-x

Toda, A., Klock, A. C., Oliveira, W., Palomino, P. T., Rodrigues, L., Shi, L., . . . Cristea, A. I. (2019). Analysing gamification elements in educational environments using an existing Gamification taxonomy. Smart Learn.

Environ. 6, 16 https://doi.org/10.1186/s40561-019-0106-1

van Roy, R., & Zaman, B. (2018). Need-supporting gamification in education: An assessment of motivational effects over time. Computers & Education, 127, 283–297. https://doi.org/10.1016/j.compedu.2018.08.018

Webster, J., & Watson, R. T. (2002). Analyzing the Past to Prepare for the Future: Writing a Literature Review. MIS Quarterly, 26(2), xiii–xxiii. http://www.jstor.org/stable/4132319

Werbach, K. (2014). (Re)Defining Gamification: A Process Approach. In: Spagnolli, A., Chittaro, L., Gamberini, L. (eds) Persuasive Technology. PERSUASIVE 2014. Lecture Notes in Computer Science, vol 8462. Springer, Cham. https://doi.org/10.1007/978-3-319-07127-5_23

Werbach, K., & Hunter, D. (2012). For the win: how game thinking can revolutionize your business. Philadelphia: Wharton Digital Press.

Xu, J., Lio, A., Dhaliwal, H., Andrei, S., Balakrishnan, S., Nagani, U., & Samadder, S. (2021). Psychological interventions of virtual gamification within academic intrinsic motivation: A systematic review. Journal of affective disorders, 293, 444-465 .

Yıldırım, İ., & Şen, S. (2019). The effects of gamification on students' academic achievement: a meta-analysis study. Interactive Learning Environments, 29(8), 1301–1318. https://doi.org/10.1080/10494820.2019.1636089

Yildiz, I., Topçu, E., & Kaymakci, S. (2021). The Effect of Gamification on Motivation in the Education of Pre-Service Social Studies Teachers. Thinking Skills and Creativity, 42, 100907.

Zichermann, G., & Cunningham, C. (2011). Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps. Sebastopol, CA: O'Reilly Media.