A Review of Data Analysis for Gamification: Challenges, Motivations, Recommendations and Methodological Aspects

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Abstract: Gamification is a significant pedagogical approach employed to facilitate learning not limited in educational setting but also across other domains. This pedagogical approach is a hot topic among academics from various disciplines. Various studies domains including education, social sciences, healthcare, tourism, engineering, translation, nursing, arts and applied arts have ventured into gamification to aid learning. Different analysis measures were employed by the researchers to carry out studies on experimental research using different samples to develop the articles. This study is developed with the aims to review and analyse the existing literature related to gamification adding to the research methodologies, types of data analyses, significant findings and also samples used to collect the data. The taxonomies developed based on the reviews made have been categorised based on challenges, motivations and recommendations extracted from the researchers who want to take gamification to the next level in different areas of studies. The researchers of this study conducted a systematic search on topics related to gamification, approaches used for the data analysis and studied on the types of data employed. Search on five main databases were carried out namely Scopus, EBSCHO, ScienceDirect, Web of Science and Taylor & Francis from 2012 September to January 2020. These databases searched were sufficient and dependable to write on gamification. Articles were carefully selected on the basis the researchers’ inclusion and exclusion criteria (n = 312). The first percentage of the studies (n=19/312) focused on game elements in relation to the implementation of gamification across different age of the learners. This portion of the studies (n=107/312) discuss on digital badges, digital gamification/digital tool, game like educational apps. The second section of the study describe about game-based learning in relation to gamification that emphasised on pedagogies, teaching skills, teaching beliefs, lesson outcomes, theories, learners, emotional engagement, innovative teaching and environment. The portion of the studies (n=43/213) discuss on serious games specifically game principles, behaviour, collaborative work, video games and accommodation of psychological needs. The fourth portion (n=66/312) is on novel emerging trends in gamification namely flipped classroom, blended learning in gamification, collaborative learning and gamification, mobile learning and gamification, CLIL and gamification, MOOC and problem solving that led to transformative pedagogy. The fifth portion (30/312) is on game based eLearning and the last portion is on motivation (47/312). Technological advancement and rapid development in information and communication technologies has increase researchers’ interest to pursue research in gamification to use it as a meaningful pedagogical tool to sustain students’ learning.

Keywords: Gamification; game-based learning, serious games

1. Introduction

Gamification has become the buzzword today as it facilitates learners’ cognitive development, affective, behavioral and sociocultural engagement to maximise learning (Plass, Homer & Kinzer, 2015). Gamification is no longer a bizarre term and is not limited to education. Its importance is extended to various disciplines including learning (Zi-Gang Ze, 2018; Butler, 2015; Chen et al., 2017), mathematics (Gil-Domènech & Berbegal-Mirabent, 2017; Huang et al., 2014; ter Vrugte et al., 2017; Wang, Chang, Hwang, & Chen, 2017), teaching, science (Law & Chen, 2016; Papastergiou, 2009), urban tourism (Chung-Shing Chun, 2019), nursing education (Ching-Jung Chung, Chiu-Lin Lai & Gwo-Jen Hwang, 2019), training, education, human resources, healthcare, medicine (Greer et al., 2016), sports, accounting & business (Careyrs & Moya, 2015), entertainment, sales and other fields. Games, irrespective utilised or popularised for entertainment or instruction, have gained recognition as a significant tool to allow maximum engagement and motivation among learners or players (Adamson, Chen, Kackley, & Micheal, 2018; Aguilar, Holman, & Fishman, 2015; Ak& Kutlu, 2015; Bossavit & Parsons, 2018).

With the advancement of technologies in the forms of mobile and multimedia, games are given utmost importance as a means to induce interest in instruction numerous educational backgrounds. Today, experts from various disciplines believe that games imposed great impact to engross learners and sustain their learning (Bossavit & Parsons, 2018; Greer, Lin, & Atkinson, 2016; Huang, Huang, & Wu, 2014; Huang, Johnson, & Han, 2013). The emergence of the application of games is a breakthrough in education (Zi-Gang Ze, 2018). Literature reveals that gamification studies is advancing and gaining significant recognition, which is known as a
hot topic. A number of significant researchers have carried out empirical studies on this field and have reported commendable results. Therefore, data analysis is deemed imperative in the study of gamification.

The importance of data analysis is paramount and has a significant role in social sciences research (Alamoodi et al., 2019). Researchers throughout the globe have employed different data analysis procedures based on their fields of expertise for various scientific reasons. Researchers have written and reported different analysis procedures for different research purposes including experimentation (Zi-Gang Ze, 2018), introduction to educational platform (Deterding et al, 2011), experimentation (Cerezo et al, 2019; Basal & Kaynak, 2019; Zi-Gang Ze, 2018), investigations (Ho, 2019), application (Hsiu-Ting Hung, 2017), evaluation (Careys & Moya, 2015), innovative intervention (Sirin et al., 2018, 2019), suitability, synthetization and development of a framework (Van der Meij et al., 2017), impacts (Ya-Ling Wang, Hui-Kou & Chin-Chung Tsai, 2019), effectiveness (Chung-Shing Chun, 2019; Jong, 2015), conceptualization (Israel et al., 2013). Some studies emphasised on the role of data analysis in terms of possible solutions to research (Turner, 2017), relationship between emerging trends (Badia, 2014) and benefits of research (Clark et al., 2017). Some raised some critical issues through critical systematic literature reviews (Kangas & Koskinen, 2016; Zainuddin et al., 2020). Other studies discussed critical issues related to suggestion to future research (Ching-Yung Chang, Chiu-Lin Lai & Gwo-Jen Hwang, 2019), suitability, synthetization and development of a framework (Van der Meij, 2017), addressing gaps (Little, 2019) and describing purpose (Michael Yates et al., 2016). Nevertheless, it is indisputable how the source of data contributes significantly in terms of its data analysis approach.

Types of data is the backbone in any research domains. The significance of the types of data often facilitate researchers to reveal interesting findings to answer the research questions posed. The types of data rely solely on interpretations made on the data analysis. In a similar vein, data analysis is another important element in the research domain as it assists the researchers to substantiate conclusion. Similarly, we realised that types of data in gamification studies revealed emerging importance on different disciplines for learners to achieve optimal learning. Types of data reported in gamification studies revealed some significance to some extent on cognitive development, however, learners’ performance increased only when aided with external factors such as e-learning environment (Zi-Zang, 2018). Content analysis and narrative analysis types of data analysis surfaced in literature, which allowed the researchers to narrate the interactions between the respondents and researchers. The types of data facilitate researchers to carry out studies for several purposes namely effectiveness (Eun-Sok Won & Jong, 2018), development of scientific method (Wang & Hsu, 2015) and experimentation (Chih-Yuan & Pei-Hsun, 2018). The Gamification studies that used content and narrative analysis reported different themes; some researchers utilised these data to answer the gaps found in the research (Dehghanzadeh et al., 2019), development of a prototype (Singh et al., 2019), carrying out investigations (Hatice, 2018), develop and design (Hsu-Ting Hung, 2018) and defining findings (Tan, 2018).

Since 2011, many different areas of studies of gamification were explored and studied by researchers by employing different methods and approaches. In spite of the discussion on types of categories explored, the present study aims to probe the challenges surfaced that obstructed the previous researchers from attempting this area. Not only that, the studies and researches conducted offered appropriate recommendations, which in return will provide some insights and guide in handling these types of areas of studies in the future. The research explored in the area of gamification is huge and massive. The current study has been designed to shed some meaningful insights based on research conducted by the previous researchers in the gamification domain of social science. The present study is designed to contribute light based on past studies efforts in relation to gamification studies by mapping the research landscape into a coherent taxonomy and influencing the appropriate elements and settings that builds this scope of the research. This is organised as follows: Section one describes on gamification, followed by the nature of data analysis employed and the types of data utilised for the analysis. Section two discusses the research methodology, literature sources, scope and steps planned in filtering the research. Section three reports on the reviews, results and statistical information of the selected articles for this study. Section four demonstrates the research landscape based on reviews reviewed which allowed for the mapping of a coherent taxonomy. Section five dwells and compartmentalised challenges, motivations and recommendations discovered by the past studies researchers. These past studies researchers were extracted from different articles pertaining to gamification from 2012 to 2020. Section six shows the methodological characteristics of past researches and their research settings. The final section which section is concluded with conclusions.

### 2. Systematic Review Protocol
The systematic review was conducted based on systematic review approach or systematic literature review (SLR). Systematic literature reviews encompass a comprehensive, in-depth explanations and careful analysis of topics selected, which can provide some implications and insights for future studies. The present study has been reviewed extensively in order to sieve through, recognize, construe, and evaluate critically the existing literature associated to the subject. This approach is the most common source of evidence researchers can employ to facilitate numerous types of research. Systematic review is known for its evidence-based approach in assisting researchers to identify gaps of study and supplement with scientific explanations. This study has the prospects of determining topics that should be researched extensively for future research. Systematic reviews are divided into two namely individual studies referred to as primary studies and systematic review knows as secondary study.

3. Information Source

Search Strategy

The articles reviewed for this study was selected based on the existent studies based on different fields of studies. The search strategy is illustrated in Figure 1. For the purpose of this study, the researchers selected five digital databases to choose the articles. (1) EBSCHO provides diverse access to journals for different domains. (2) Scopus offers world’s research outputs for various domains. (3) Web of Science (WoS) includes journal articles from various domains, such as social sciences, arts and the humanities. (4) Taylors and Francis offer great academic journals and (5) Science Direct offers researchers, teachers, students, healthcare and information professionals use ScienceDirect to improve the way they search, discover, read, understand and share scholarly research.

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<thead>
<tr>
<th>Database</th>
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<tr>
<td>EBSCHO</td>
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<td>WOS</td>
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Search Queries

The search for this study was conducted right after attending systematic literature conducted by two established and prominent journal article writer Assoc. Prof Dr Aws and Dr. Bilal from Universiti Pendidikan Sultan Idris. The researchers were motivated by the knowledge shared by these two prominent and prolific writers on systematic literature. This was conducted in September 2019. Next, the researchers discussed with the speakers on determining the keywords of the study. At the end of September 2019, the researchers carried out the search in the search boxes based on five databases namely: EBSCHO, Scopus, Web of Science, Taylors & Francis and Science Direct. Various word combinations and different terms were used to describe the three focus areas: “AND” operator was used between focus areas, and “OR” operators were used inside each focus area to gather phrases and words with similar meaning. Our first area of interest was related to gamification followed by the second area, which sought to find different types of data analysis searches available in the literature. The researchers did not include chapters of books, books and other types of report that do not belong under conference articles/proceedings and journal articles. Only two selections were appropriate to be considered for inclusion based on current and updated scientific papers related to the interest of the study under investigation.

Study Selection

The search queries were formed by postulating the main terms and adjacent meaning of each section. The first section focused on synonyms and terms related to gamification. The second section aimed to hunt for different types of data analysis. A good number of search attempts resulted in the following search queries. The queries were expressed as three parts, which were used during the phases of title and abstract scanning and full text reading.

(gamifying OR gamify OR gamification) AND (teach OR teaching OR learn OR learning) AND (“teaching English” OR “English teaching” OR “learning English” OR “English learning” OR “English language”)
(gamifying OR gamify OR gamification) AND (teach OR teaching OR learn OR learning) AND (“teaching English” OR "English teaching" OR "learning English" OR "English learning" OR "English language")
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Inclusion and Exclusion Criteria

A set of criteria were enforced for the selection of studies during the initial screening process. Studies were included if they were published between 2013 and September 2020. An additional criterion limited papers from all databases to English language. ScienceDirect papers must include articles, review articles or short surveys. The first aspect was on game elements that comprised of digital badging, digital tool game like, educational apps, mobile application and interactive response system. Game based learning (GBL) is a sort of game play that comprises distinct learning outcomes was included followed by pedagogies, theories, innovative teaching, learners, response, teaching skills, critical thinking, learning skills and environment. Next, the researchers looked at serious games, principles, procedures, communication skills, behaviour, costs and skills. Then, we categorised gamification into novel emerging trends that was further divided into blended learning and gamification, flipped classroom and gamification, collaborative learning and gamification, mobile learning and gamification, CLIL and gamification and transformative learning. Finally, we categorised other construct under other that include motivation, engagement, achievement, creativity, fun, interactive, cognitive, psychology and psychomotor.

Inclusion Criteria:
* Title is in English
* EBSCHO are articles or review articles
* SCOPUS are conference papers/proceedings, journal articles
* WOS are just journal articles
* Taylors and Francis are just journal articles
* Science Direct are just journal articles

Exclusion Criteria:
The samples are below 5 years old
* if the study does not specify samples, research design

Screen out of duplication – 3660
660–3000

Inclusion Criteria:

Title and Abstract scan
3660
3300
360

Full text reading
360
48
312

Second full reading and final included set
312
Taxonomy

This section presents our taxonomy, which summarizes the result of our search process. The process began by searching, scanning, filtering and full-text reading of all selected articles. Upon the completion of the previous phases, all articles were classified into six major categories and various sub-categories. The first category, gamification is associated to assimilating game mechanics or game principles in non-game contexts. Gamification drives individual desires towards achieving goals or objectives that would benefit them and give them a sense of accomplishment.

Games

The foremost major category of the taxonomy is related to the game elements (n= 19/312) articles. This section elucidates in depth elements related to gamification by separating them into 6 sub-categories

Game elements (n=19/312)

Gamification refers to the notion of accumulating game elements to activities that are not fundamentally game-based. Learners are usually given rewards to increase their participation and motivation for certain behaviours. Educators or practitioners from different disciplines can induce gamification to boost student/client engagement by providing them opportunities to progress at their own learning space through carefully designed activities. Following are the studies that have included game elements for students with digital badges-and-points as to achieve explicit behavioural and learning goals (Homer, Hew & Tan, 2018), (Toasa et. al., 2019; Segura & Parra, 2019), (Pitura & Terlecka-Pacut, 2018), (Fahruddinov, Khamikzyanova, Melnikova & Shamsudinova, 2017), (Pitura & Chmielarz, 2017), (Appiahene, sante, Kesse-Yaw & Acquah-Hayfron, 2017). (Purgina, Mozgovoy, Ward, 2017), (Pan, 2017), (Kamnardsiri et al., 2017), (Berns, Isla-Montes, Palomo-Duarte et al., 2016), (Gomez-Alvarez, 2016), (Elmiligi, Ramirez & Walton, 2016), (Lochmann, 2016), (Yong & Min, 2016), (Cox & Jason, 2014), (Moncho Puchol, 2017), (Ferreira, 2017), (Anindhitia, Vida & Dessipuji, 2016) and (Korkealehto, 2016).

Digital badging (n= 22/312) related articles show the link and importance of the digital badges in gamification as it promotes learning applied in non-game contexts. Digital badges work like rewards given to the students or members in an organization to appreciate and recognize their hard work and contributions made during participation of a task. In other words, badges awarded in gamification represent students’ contribution towards working hard to achievement. In gamification, it is imperative to alert and inform the learners that their contributions have been recognised and therefore this would motivate them towards better achievements in learning. Following are the studies that have put emphasis on digital badging: (Zucker & Hicks, 2019), (Dafit, Sumardi & Asib, 2019), (Filippou, Cheong & Cheong, 2018), (Homer, Hew & Tan, 2018), (Cook, Gremo & Morgan, 2017), (Looyestyn et al., 2017), (Pham & Chen, 2018), (Song & Sparks, 2017), (Zhou et al., 2019), (Zinnen & Godharde, 2018), (Magista, Dorra & Pean, 2018), (Oak, 2018), (Whitton, 2018), (Kingsley & Grabner-Hagen, 2018), (Yuen, 2018), (Wei et al., 2018), (Homer, Hew & Tan, 2018), (Chen et al., 2018), (Basal, Ahmet & Elcan Kaynak, Naime, 2019), (Chung-Shing Chan, Yat-hang Chan & Tsz Heung Agnes Fong, 2019), (Yurzenko, Aliona, 2019), (Karaaslan, Hatice & Kilic, Nurseven & Guven Yalcin, Gamze & Gullu, Abdulkadir, 2018).

Digital tool/Digital Gamification related (n=14/312) has gained its place in the educational context as to substitute traditional educational methods which found to be teacher centred and students are merely the passive recipients and receptors of knowledge. Digital tool has helped the students to explore, experiment and apply their critical thinking skills to be able to reason, interact and collaborate with peers and their surroundings. Digital tools have aided teaching and learning process in the classroom and has now become one of the important educational methods to facilitate learning in education today. Digital tool is not only seen in education but also across domains like health to provide some insights to patients regarding health development. Digital tools have been used extensively to assist learners with learning disabilities to enhance learning for example identifying numbers, alphabets and literacy. Digital tool is a breakthrough in terms of technology today as it is able to reach out many individuals with learning disabilities to provide educational information that are relevant. Following are the studies that have put emphasis on digital tools digital gamification: (Dehghanzadeh et al., 2019), (Pinar & Kaya, 2019), (Coleman & Money, 2020), (Lee, 2019), (Blume, 2018), (Yang, Lin & Chen, 2018), (wichadee & Pattanapichet, 2018), (Adukaite et al., 2017), (Kayimbasjiglu, Oktekin & Haci, 2016), (Reinhardt & Sykes, 2014), (Kalir et al., 2014), (Zou, Huang & Xie, 2019), (Wang, Hou & Tsai, 2019), (Hoja Dehghanzadeh et al., 2019).
**Game-like Educational Apps** (n= 9/312) in gamification has gained recognition due to its nature to engage learners to achieve specified learning outcomes. A number of game-like education apps have been developed as it provides rich and valuable immersive learning experiences for various disciplines including to improve communication skills, behaviour, training purposes, professional development and others. It is apparent to note that most of the game-like educational apps developed were focused on pre-school children to learn the language skills and also mastery of vocabulary for example of the studies developed My-Pet-Shop educational app to assist and enhance children’s vocabulary. Another game-like educational apps was developed to assist the medical sciences students to improve their learning. Besides learning, the educational app allowed the students to collaborate as a team and participate actively during the lesson. Hence, educational games do not just enhance learning but other skills like critical thinking, decision making were also apparent. The following are the studies that have shown emphasis on game-like educational apps to motivate learners to achieve goals: (Zhao, 2019), (Dele et al., 2019), (Suprapto & Irrahali, 2019), (Tshering et al., 2018), (Mosalanejad, Razeghi & Ifard, 2018), (Rachels & Rockinson, 2018), (Low, Yap & Sarwar, 2018), (Zou, Wang, Xie & Kohmke, 2018), (Muller et al., 2017).

**Mobile Application** can also improve students’ performance (n=29/312) in gamification reported to be very helpful because it exports the elements from games to produce fun and playful learning experience for students and also users. This technique where by the combination of gamification in mobile application allows the learners or users to acquire knowledge with retention. With mobile application in gamification, learning experience is sustainable. Furthermore, when learners or users participate in gamification activities through mobile application, it increases opportunities for engagement and thus this would create a unique learning experience. Mobile application in gamification supports motivation and affective engagement (Cerezo, R., Calderon, V., & Romero, 2019). The following are the studies that have shown gamification in mobile application: (Liu, Holden & Zheng, 2016), (Jason, & Amanda, 2018), (Segura, Adrian & Parra Gonzalez, 2019), (Ozdener & Demirci, 2018), (Gallagher et al., 2019), (Lee et al., 2018), (Iyawa et al., 2019), (Samur, 2018), (Cerezo, Calderon & Romero, 2018), (Elaish et al., 2019), (Mozgovoy & John, 2019), (Thongkoo, Panjaburee, P., & Daungcharone, 2020), (Soraya, 2019), (Elaish et al., 2018), (Samonte, 2018), (Tamtama, Suryanto & Suyoto, 2020), (Irtaza et al., 2018), (Aliah, Ahmad & Maksom, 2018), (Pelser-Carstens, Veruschka & Blignaut, 2017), (Heryadi & Muliani, 2016), (So et al., 2017), (Al-Azawi, 2017), (Miladi, Yessad, Carron & Gargouri, 2017), (Peterson, 2016), (Prandi, 2016), (Smith, 2016), (Marengo, Pagano & Ladisa, 2016), (Yang et al., 2014).

**Gamified Interactive Response System** related (n= 1/312) plays a vital role in gamification as students can perform better and collaborate actively during the teaching and learning process. Interactive response system is a powerful tool to assist students optimise their learning. combination of Interactive Response System (IRS) and gamification elements to investigate junior high schools extrinsic and intrinsic motivation, engagement towards learning English (Sun & Hsieh, 2018). Utilization of a combination between interactive response system (IRS) and gamification elements to make the teaching and learning of English classes more interesting and fun as the researchers used clickers as opposed to small whiteboard to create learning environment more conducive, challenging, competitive and highly interactive (Sun & Hsieh, 2018), kahoot as online gamification to inculcate intrinsic motivation and engagement in learning English (Iaremenko, 2017).

Gamification is related to various domains of game-based learning and serious games across many sub-categories. The second category; game-based learning, is related to different purposes of aspects of learning. Others is related to studies that do not fall in any of the previous categories. This section also presents the overlap between the major main categories. The main categories with their sub-categories are described in the next sections.

**Game-based Learning**

Game based learning (GBL) is a sort of game play that comprises distinct learning outcomes. Basically, game-based learning is developed as to strike a balance between the content with gameplay and the capability of the users or players to absorb and apply related content matter learn to the real-world context. Game-based learning is also viewed as an approach to teaching, where students discover and explore elements or aspects of games in a learning paradigm developed by the teachers. Both teachers and students team up and cooperate so to explore the content to make learning more engaging and interesting. The category offers (n=30/312) articles for this domain.

**Pedagogies** related articles describe teachers’ efforts using technology and online resources to redesign class activities by infusing rules of play so that learning can be engaging and interesting. One classic example is apparent in a study carried out by Hung (2018) that reveals how teachers flipped learning to ensure students
participate actively in the tasks assigned and also accountable for learning. As for game-based learning, teachers prepare the tasks in line with the content and incorporated technology enhanced board games (TEBGs) were incorporated to cultivate and promote engagement among the students. The game elements included in game-based learning will ensure students activate their critical thinking to participate in the tasks assigned. Studies pertaining to game-based learning include (SimCity, Minecraft, and World of Warcraft (Al-Azawi, Al-Faliti, & Al-Blushi, 2016), application of general game-based learning principles through live video-game immersive experiences meaningful to language learning (Newcombe & Brick, 2019), development of a game-based English learning setting to find out in what manner different levels of attributes would have effects on children’s learning and gaming performance (Yang, Quadir & Chen, 2019), gamified teaching as a pedagogical approach that incorporates principles of gaming to assess students’ assignments and grading (Brunvand & Hill, 2019), development of a conceptual framework through literature review to look at how student-centred learning is promoted when elements of digital game-based learning are introduced (Coleman & Money, 2019). (Yang, Lin & Chen, 2018) used game-based learning to overcome and reduce learners’ high anxiety. Chun, Huang & Hwang (2014) findings suggested that computer and information technologies infused with gaming strategies can eliminate mathematical anxiety among students. This is another evidencethat shows the importance of applying digital mathematics games for the future. Game-based learning has the potential to increase students’ learning motivation, learning achievement and self-efficacy (Vukovic et al. 2013). Game-based learning blended with problem-solving to improve students’ achievements in mathematics (Pratama & Setyaningrum, 2018), game-based learning embedding one of the most vital features known as the computer-based agency to learn Mathematics using game called Decimal Point (Nguyen, Harpstead, Wang & McLaren, 2018). Some studies have reported on the use of digital game-based learning to promote creativity in writing (Lee, 2019), game-based learning to encourage students’ motivation and participation (Pereira, Veiga, Vasco & Veiga, 2017), incorporation of games-based learning principles to recognise and categorise students’ learning affordances in selecting video games (Newcombe & Brick, 2017), using game-based approaches to teach English specifically in developing speaking skills and vocabulary in order to improve acquisition in foreign language (Fahruutdinov, Khakimzyanova, Melnikonova & Shamsutdonova, 2017), using game-based learning to learn American Sign Language (ASL) to improve sign language actions (Kannاردsiri, Khwuthyakorn & Wongta, 2017), self-efficacy in game-based learning in a foreign language context developed with digital badges, leaderboard ranking, and learning practice with star icons (Yang, Quadir & Chen, 2015), game-based learning in STEM and was suggested to integrate game-based learning in the traditional based curriculum (Lan, 2015), proposal a concept of gameful learning to encourage playfulness and interaction (Kalir, Kupperman, Dorfman, Mackay, Saunders & Pratt, 2014).

**Teaching Skills** related articles reveal teachers and educators’ approaches to constantly keep abreast with the last changes and development in education. This area covers teachers’ approaches to create edutainment games to teach data mining techniques within the domain of game-based learning (Cengiz, UlasBirant, Yildirim & DeryaBirant, 2017). To make learning more interesting, introduction of a mind mapping-based contextual gaming approach to write in English was introduced (Fu, Lin, Hwang & Zhang, 2019), most of the teachers have used Kahoot to complement their teaching for example using kahoot to teach vocabulary ((Medina & Hurtado, 2017). The need for teachers to provide more platform for students to think differently as to refine their thinking is important. Adopting technologies would be an appropriate strategy as revealed by these studies: gaming effects through the use of video games and its effects on teenagers’ informal learning and development (Matijević & Topolovečan, 2019), digital game-based learning to promote creativity in writing (Lee, 2019), development of android-based education game (Falahah & Alinda, 2019), pilot study on designing game design among graduate and engineering management programs (Viswanathan & Radhakrishnan, 2018), the use of online educational games for language learning (Muller, Son, Nozawa & Dashhtestani, 2018), development of educational games in psychiatric course (Mosalanejad, Razeghi, Abdullahifar, 2018).

**Teachers’ Beliefs** (n=3/312) related articles can provide significant insight into many aspects of teaching and also across domains. Teachers; beliefs have taken a major role in influencing ways teachers teach. With the advent and development of information and computer technologies, teachers believe that their personal constructs can provide greater insights into their teaching. So, teachers’ beliefs’ regarding gamified-based learning and its effects on learners’ learning would allow for accomplishment of attaining educational outcomes. Following are studies that relates gamification to teachers’ beliefs: (Blume, 2020; Blume, 2019; Sanchez, Marti & Aldás, 2016).

**Lesson Outcomes** (n=7/312) related outcomes refers to applying well-developed digital and non-digital games to kindle learners’ mastery of the language including grammar, vocabulary, listening skills, speaking skills, writing skills, reading skills, problem-solving skills, transfer of knowledge, creative and critical thinking skills. Games elements are crucial to be included into the learning environment as this would give the learners an
opportunity to participate and engage in the learning. Following are the studies that put emphasis on lesson outcomes in game-based learning: (Stapinski, 2019; Haoran, Bazakidi&Zary, 2019); Jabbar & Felicia, 2015; Cengiz, Birant&Derya, 2017); Viswanathan&Radhakrishnan, 2018);(Li, Mok, SYuen& Chu, 2018);(Careyns& Moya, 2016).

**Theories** related articles (n=16/312) show the importance of play in learners’ learning and cognitive development. Most of the articles reviewed describes the researchers’ focus and attention towards pre-school learners as they are aware that play is being acknowledged as an integral and growing stages of children’s cognitive development. This is apparent as the researchers conducted studies on game-based learning on children as young as five-year-old to twelve years olds as demonstrated in these studies: (Girmen& kaya, 2019; Chong, 2019; Blumberg et al., 2019; Chen et al, 2019; Yunus& Azman, 2019; CerezRev & Romero, 2019; Kayimbasioglu, Oktekin&Hace, 2016; Sanjuan, Jurd&Nacher, 2018; Chen & lee, 2018; Hwa, 2018; Imlig&Petko, 2018; Ros-Morente& Caballo, 2018; Homer, Hew & Tan, 2018; Jason, Amanda &Rockinson-Szapkiw, 2018; Jie, Quadir& Chen, 2015). There reason behind the researchers introducing game-based learning for children is also due to the influence of the Paiget’s theory that put emphasis on play that is symbolic, abstracts and social because children grow mature through varies growing stages. Play is one of the important factors that would contribute and influence children’s cognitive development. Teachers or educators must activate children’s schemata as this would allow them to interact with reality outside their surroundings.

**Learners** related articles (n=) specify learners from different age range who were exposed to game-based learning to improve their learning. Learners here are divided based on learners from the pre-school, learners with learning disabilities, primary school, secondary schools and tertiary education who were expose to gamification learning environment: gamification for deaf students who want to learn (VidiaAsindhita, Despuji Lestari, 2016), gamification and educational system’s role for 5 years old pre-schoolers (Kayimbasioglu, Oktekin, HuseyinHa, 2016), gamification as a method to encourage students to complete out-of-class activities (Huang & Hew, 2018), application of gamification elements specifically for science education to increase students’ motivation (Hursen& Bas, 2019), learn Italian language through game-like educational apps meant to increase students’ motivation towards achieving a better learning outcomes (James & Mayer, 2018), interactive and dynamic game for children aged four to five years old to improve the mastery of the English language (Toasa et al, 2019), Kahoot to teach English grammar to Primary three school pupils and its impact on learning (Yunus& Azman, 2019), prototype development for engineering students to boost their speaking skills incorporating MUET syllabus (Singh et al, 2018), gamification to reduce dropout rate among Computer Science students and encourage students to learn by giving them rewards and rankings (Iyawa, Masikara, Osakwe& Oduar, 2019), development of the WordBricks to assist learners to construct grammatically correct sentences (Monica, Maxim & Marina, 2019), development of Vocabgame available on Google Play Store designed as to assist students to learn English better and to achieve better performance (Elaiish, Ghani, Shuib& Al-Haiqi, 2019).

**Emotional Engagement** related articles (n=6/312)in relation to game-based learning is viewed successful because of emotion allows learners to be engaged in learning. The results of these studies showed that games are capable to engage and facilitate learners’ learning process: (Pitura&Chmielarz, 2019; Irav, Pathak & DeRosier, 2019; Ros-Morente, Caballo &Filella, 2018; Sun & Hsieh, 2018; Kidd, 2015; Ruiz, Casuso, Suárez& Martínez, 2017).

**Innovative teaching** related articles (n=28/312) discusses the teachers’ approaches in gamification where by they induce other teaching strategies like flipped classroom, information and communication technologies to minimize distraction (Kayimbasioglu, Oktekin, &Haci, 2016; Garcia et al, 2018), competitive gaming scenario (Wei et al, 2018), other innovative gamification pedagogies (Taylor, Kumar & Bain, 2017; Filippos et al, 2018; Usami et al, 2015; Hsiu-Ting Hung, 2017; Mei& Yang, 2019; Hung, 2018; Wang&Lv, 2018), Hung, 2018; Nishida &Braga, 2015); Ward&Mozgovoy, 2019); Lucchieri et al, 2019; Wang, 2019); Lam, Hew & Chiu, 2018; Abu Bakar et al, 2018; Lo & Hew, 2018; Pratama&Setyaningrum, 2018); Kuhn, Jeff & Stevens, 2017;Vlachopoulos&Makri, 2017; Hung, 2016; Stoakley &Kim, 2017;Topirceanu, 2017); Kingsley& Grabner, 2015; Fguero, 2015; Vate, 2015; Kangas,Koskinen & Krofkos, 2016).

**Environment** related articles (n=8/312) show the importance of connecting the learners with their learning environment as to be conducive and safe. One of the environments refers to joyful learning (He et al., 2017). Teachers must foster an environment that includes 21st century learning skills (Ismail et al., 2018), gamification that promotes contextual learning environment (Fu et al., 2019), environment for language learning: (Yanes&Bououd, 2019; Mgrovejo, Mamani& Tipo, 2019; Won& Kim, 2018; Sirin et al., 2018; Kinshuk et al., 2017).
Serious Games

The main aim of serious games is not fun or entertainment, it focuses on learners learning or practising a skill. Serious games have been explored in disciplines including health, science, education, defense or business. Very often, the purpose of employing serious games is meant to expose learners to master a skill and practice thoroughly. Yanes & Bououd (2019) reported blending gamification and serious games for English language learning and findings revealed implications of opportunities and challenges associated with gamification and serious games, comparison between serious games and educational simulations to promote deep thinking (ImlegIld & Petko, 2018), development of an innovative online drug education game known as 'Pure Rush' (Stapinski, Reda, Newton, Lawler, Rodriguez, Chapman & Teesson, 2018), systematic literature review on infusing serious games and pedagogical features (Pellens, Hounsell & Silve, 2017), using the design of videogame known as Riskware to augment learning experiences for risk management teaching in software projects (Gomez-Alvarez, 2016), reviews on using multiplayer online role-playing games (MMORPGs) that allows for proximal development (Plass, 2016), using mobile serious game that put emphasis on Socio-Cognitive Conflict (SCC) to assist pre-school and primary school pupils to understanding and master concepts of recycling and topographical orientation (Prandi, Mirri, Salamoni & Mazzoni, 2016), adapting serious games to improve undergraduates’ literacy skills (Smith, Hickmott, Bille, Burd & Stephens, 2016),

Game-Principles (n=21/312) related articles describes the fundamental game principles students have to adhere and learn in a given personalised learning environment. The following articles emphasizes the game principles: (Keyondia & Schamroth, 2019; Aseriskis & Damasevicius, 2014; Matijevic & Topolovean, 2015; Haoran, Bazakidi, & Zary, 2019; Baptista, Goncalo & Oliveira, Tiago, 2017; Ramirez-Rosales, Vázquez-Reyes, Villa-Cisneros & De León-Sigg, 2016; Swiatek & Gorse, M, 2016; Ebers & Brune, 2016; Kirici & Kahraman, 2015; Hamada & Wakabayashi, 2014); Jinhui Li et al., 2018; Singh et al., 2019; Brunvand & Hill, 2018; Martin, Basinet & Rosenblum, Schwartz, & Klein, 2018; Pérez, 2018; Xanthopoulos & Xinogalos, 2018; Pellens, Hounsell & Silva, 2017; Prieto & Medina, 2017; Lopez & Tucker, 2017; Marjoleine, Jacqueline & Frank, 2017; Nivedhitha & Sheik, 2019).

Behavior (n=7/312) related articles embed game design elements to engage, motivate and teach lesson in the classroom. Researchers created games that require behaviour change of its users by providing scenarios reflecting to real life and also related to real lives events: (Johnson, Horton, & Mulcah, 2017; Dimitrios & Niemann, 2017; Blumberg et al., 2019; Cheng, Liao & Chang, 2018; Soboleva, Galimova, Maydangalieva & Batchayeva, 2018; Udajja, 2018; Janet, 2019).

Collaborative Work is apparent in serious games where by learners are allowed to collaborate in terms of sharing their views to solve a problem: (Bal, 2019).

Video Games (n=9/312) related articles in serious games focuses on learning and practicing a skill of learners: (Matijević & Topolovean, 2019; Gekker, 2018; Barringer et al., 2018; Filippou, Cheong & Cheong, 2018; Abbasi et al., 2018; Newcombe & Brick, 2017; Hadi, 2017; Ebrahimzadeh & Alavi, 2017; Osma-Ruiz et al., 2015).

Accommodate Psychological Needs (n=5/312) of SDT, namely: competency, autonomy, and relatedness. (Zainuddin, 2018; Plass, Homer & Kinzer, 2015; Girmen & Kaya, 2019; Heather & Woodruff, 2017; Marini et al., 2018).

Novel Emerging Trends in Gamification

Gamification has allowed novel emerging trends in education where by educators and teachers have merged gamification with other teaching strategies to make teaching and learning more meaningful. Some of the studies that have used gamification with other teaching strategies are shown as follow: gamified flipped classroom to teach narrative essays (Ho, 2019), teaching basic language skills infuse with digital story activities and games by adopting flipped classroom Model (FCM) among fourth grade students (Girmen & Kaya, 2019), reviews on gaming as one of the most promising strategies (Davis, Chen, Hauff & Houben, 2018), contemporary practices known as let’s play video (Gekker, 2018), gamified flipped classroom approach for teacher to prepare activities that will engage students (Hungh, 2018). C programming language concept through a mobile game (Daungcharone, Panjaburee & Thongkoo, 2020), educational game to promote Java language among vocational students (Soraya, Elmunsah, Indriyani Setiawan & Ristanti, 2019), playful approaches to teaching and learning to retain enjoyment among students (Whitton, 2018), integration of games in learning theories to teach business informatics (Talaei-Khoei, Kerr & Motiwalla, 2018), acceptance rate of gamification among undergraduates.
gamification and application of makerspace concepts as the emerging current trends in engineering field and reported on the importance to have a balance between the approaches so that students are tuned towards learning (Martin & Klien, 2017), incorporating computer-based games into instruction to encourage teachers to learn about video game software (Kuhn & Stevens, 2017), games as means of innovative teaching methods to prepare future professional in higher education institutions infusing learning outcomes to ensure focus on cognitive, behavioural, and affective (Vlahopoulos & Makri, 2017).


**Flipped Classroom & Gamification** related articles show the combination of the flipped classroom and gamification approach to bring about effective results of learning. Educators are aware that gamification can leverage knowledge acquisition. Flipping learning means educators are moving away from the traditional method of teaching as to give students to the opportunity towards experiential learning experiences. Gamification offers plenty opportunities that will allow learners to be more active in gaining knowledge, get engage in construction and reconstruction, reinvention and experimentation of experience. The following are the studies that have used gamification and flipped classroom concurrently: gamification integrating instructional approaches namely flipped classroom and traditional learning to examine grade nine’ students’ achievement in Mathematics (Lo & hew, 2018).

**Blended Learning & Gamification** related articles discuses on blended learning and emphasis on gamifications elements to learn English among healthcare students (Korkelaehto & Salo, 2016), technology assisted language learning blended with gamification activities to boost learning among children (Kayimbasioglu, Oktekin & Haci, 2016), gamification technique to sustain the learning of vocabulary (Hasegawa, Koshino & Ban, 2015), using android mobile devices in game-based education (Kirci & Kahraman, 2015), using gamification to twig the existing curriculum to a game-based learning environment (Kingsley, Grabner-Hagan, 2015)

**Collaborative Learning & Gamification** development of a table-top game to address learning needs of the accounting profession so that the lecturers can incorporate good teaching strategies and application of methodologies (Pelser-Carstens & Blignaut, 2017).

**Mobile Learning & Gamification** combination of mobile learning engagement with PACARD (Personalized Adaptive CARD-based interface) comprised of personal adaptation, badges push notifications (Pham & Chen, 2018), learning grammar using mobile app known as WordBricks (Purgina, Mozgovoy & Blake, 2017), development of a mobile application Mnemorizer to assist students master vocabulary for examination purpose (Safi, BadiloUrquiola, Shahid, Mahmood, Haider & Zaheer (2018), success rate of mobile gamified apps and careful guidelines for mobile learning companion (Baldauf, Brandner & Wimmer, 2017), development of a mobile 3D-CCGBLS (3D Cardiac Catheterization Game-Based Learning System) to boost students motivation and learning achievement (Su, 2017), proposing a framework to teach the Secwepmctsin language based on NCF-mobile application to induce joy, fun and resilience among students (Elmiligi, Ramirez & Walton, exploring new learning strategy that would benefit students from the mobile computing course through designing computer games (Al-Azawi, Al-Obaidy, Ayesh & Rosenburg, 2016), proposing an implicit approach grounded on data mining which mimics the learners’ type when they play and this would be captured in an Educational Massively Multiplayer Online Role Playing Game (EMMORPG) (Miladi, Yessad, Carron & Gargouri, 2017).

**CLIL & Gamification** related articles dwell on gamification in the context of extracurricular CLIL project to boost main competences in upper secondary schools (Pitura & Chmielarz, 2017).

**MOOC** related articles discus using educational platforms and modern gaming to promote students’ cognitive activity in computer game instruction technology (Soboleva, Galimova, Maydangalieva & Batchyeva, 2018).
infusion of gamification in MOOC courses to increase students’ engagement in learning (Abu Bakar, Yusuf Lahad & Ahmad, 2018), review of six gamified learning environments developed for EFL context (Mikasyte, 2019).

**Problem Solving** related articles in gamification helps learners to activate their thinking skills to solve problems in their respective subjects. A pilot study on gamification approach blended with problem solving on a group of students undertaking Mathematics (Folgieri, Vanutelli, De VecchiGalbiati&Lucchiareri, 2019), analysis of review on gamification and health, using sciencemetric and content analysis methodologies (Segura-Robles & Parra Gonzalez, 2019), games-enhanced scenario based assessment to improve argumentative skills of students (Song & Sparks, 2017), rewarding students with digital badges (Zhou, Chen, Fan & Ji, 2019), digital games to promote problem-solving strategies and scaffolding learning to improve numerical problems (Sun, Chen & Chu, 2018), development of a gamified reader called as RB to assist students to increase their reading speed, give them a sense of autonomy and develop their problem solving skills (Che, Lee & Chu, 2018). Using the “What-Say-You” board game to improve polytechnic students’ speaking skills (Fung & Min, 2016), games a means to look for an alternative solve problems that would benefit students’ professional life (Chubarkova, Sadchikov, Suslova, Tsaregorodtsev&Milova, 2016).

**Transformative Pedagogy**

The discussion above on novel emerging trends in gamification has given ways for merging of other teaching approaches also known as transformative pedagogy. The studies reviewed on gamification and combination of other teaching strategies by the researchers show the importance of empowering learners to co-construct knowledge from surroundings as to promote rich personal experiences.

**Game based eLearning** is a powerful learning tool as it allows students to maximize engagement in learning. The utilization of this digital gamification/game based learning is not just limited in the field of education but also related and employed in healthcare, tourism, business and marketing and second language learning and also other fields. Digital gamification/game based learning is believed to promote fun learning and also viewed as an approach to facilitate second language learning. Learners learn better in gamified environments as it is truly engaging, fun, motivating and enjoyable. The use of gamification has positive effects on learners’ learning experiences and learning outcomes. Missing from the literature is the detailed gamification elements related to this learning outcomes and experiences. The design of the digital gamification has implications towards learners’ learning outcomes and experiences. Digital gamification associated articles (n=30/312) (Dehghan-zadeh, Fardanesh, Hatami, Talae&Noroozi, 2019), prototype development designed as to motivate and engage engineering students towards improving their speaking skills was proven to be a novel findings (Singh et al., 2019), development of e-course based on the LMS MOODLE that was infused with elements of gamification such as games, badges, Easter eggs and leaderboard were found to be effective to enhance students’ motivation (Yurzenko, 2019), learning English by adopting and applying valuable elements from gamification (Lina LaffaJassim, Hisham Dzakiria, 2019), Karacaalan, Kilic, Yalcin &Gullu, 2018) combined synchronous and asynchronous learning materials to teach vocabularies through interactive virtual learning platform. Ling (2018) looked at the impact of meaningful gaming on students’ motivation in a higher education setting, development of digital card games for educational purposes (Kordaki, 2017), learning through instructional digital games among pre-school children (Samur, 2019), adapted the prize-winning holographic game and designed a novel mobile application to assist Spanish speaking children to practice English pronunciation Cerezo, Calderon & Romero, 2019), development of educational app for accounting students (Zhao, 2019), a study on pre-service teachers’ behaviours and beliefs regarding digital game-based language learning (DGBLL, Blume, 2020), reason why educators marginalised digital game-based language learning (DGBLL) (Blume, 2019), development of a virtual reality (VR) game-based e-assessment application (Azawei, Baiee& Mohammad, 2019), development of a SpeedyRocket utilised in rural schools (Dele Ajayi, Strachan & Pickard & Sanderson, 2019), impact of augmented reality game Pokemon GO on students’ mathematics performance (Ruiz-Uriza, Casuso, Suarez-Manzano & Martinez-Lopez, 2018), pilot study on gamified flipped classroom to foster students’ cooperation skills, social engagement and autonomy (Zainuddin, 2018), technology facilitated urban gaming (Pitura&Terlecka-Pacut, 2018), combination of gamification and personality traits through to propose the Hybrid Learning Model to boost student’s academic achievement and motivations (Kang & Kusuma, 2020), development of mobile apps using gamification for kindergarten children (Tamtama, Suryanto&Suyoto, 2020), reviews on technology, pedagogy, and gaming (Laine, 2018), implementation of the M-learning elements into mobile game technology (Yahya, Ahmad &Maksom, 2018), hedonic theory and observational theory to propose a model that would exemplify gamer’s playful consumption (Abbasi, Ting, Hlavac&R Fayyaz, 2018), discussing key issues on location based games for educational purposes (Xanthopoulos&Xinogalos, 2018), a reviews on disadvantages of video games and current developments in technologies (Kenwright, 2017), computer games to
be proven to improve vocabulary acquisition and some limitations as not all games are beneficial for language learning (Klimova&Kacet, 2017), digital gaming by South African tourism teachers for better learning opportunities (Adukaite, Zyl, Sebnem&Cantoni, 2017), combination of a gaming approach with optimal language learning (Stoakley& Kim, 2017), incorporating instructional video games to teach vocabulary (Hadi, 2017), digital commercial digital video to boost students’ motivation in learning (Ebrahimzadeh&Alavi, 2017), combination of gamification with mobile assisted language learning to improve students’ English competencies (So, Shin, Wong & Davaasuren, 2017), analyse the educational 3D mobile game "Labours of Hercules" (LOH) using the main elements of games (Kocadere, Bayrak, Kibar, Caglar&Sayan, 2016), combination of game-based learning and mobile learning to maximise learning experiences for teaching German (Marengo, Pagano & Ladisa, 2016), development of game-based system for learning sign language to master vocabularies suing Kinect (Kamnadsiri, Homsit, Khuwuthyakorn&Wongta, 2016), game-based learning as an evolution in IT and education (Marengo, Pagano & Ladisa, 2016), named "MyEVA (My English Vocabulary Assistant) Mobile" to improve vocabulary (Yang, Yang & Wu, 2014) and roleplaying games and their implications for arts education to make learning more exciting (Cox, 2014), the use of educational games to assist Spanish students’ English vocabulary (Mogrovejo, Maman& Tipo, 2019), gamification modified to be meaningful for scaffolding reading (Ling, 2018), the influence of in-class gamification activities and home activities (Sasi, Chang, Aksal, Kayiimbasioglu, Haci, Kinshuk&Altmey-Gaz, 2017), a study on combining flipped classroom based on your bring your own device (BYOD) to gamify learning (Hsiu-Ting Hung, 2016), overcoming mastery of lexical item by creating a board game to retain learner motivation and attention (Jaquen& Ferreira, 2015), gamifying learning through the use of videos to master the learning process (Osma-Ruiz et al., 2015), kahoot as a catalyst to enhance students motivation (Lee, Hao, Lee, Sim & Huang, 2019), incorporation of games elements to learn vocabulary (Schneider & Ackels, 2019), gamification in the form of Kahoot to improve students’ perceptions and motivation (Ismail, Sa’adan, Samsudin, Hamzah, Razali &Mahazir (2019), effects of Interactive Learning Environment (ILE) using elements of gamification (Zinnen&Godehardt, 2018), effectiveness of employing game based design element for online learning environment (Van Roy & Zaman, 2018), review on gamification and game-based learning (Magista, Dorr&Pean, 2018), gamified spelling learning for kids based on the Dzongkha App (Tshering, Norbu, Dorji, Dema&Dhungyel, 2018), using the Octalysis framework combined with the elements of gamification to foster learning ( Oliveira & Cruz, 2018), gamification and its application to pedagogical concepts (Martin, Basinet, Rosenblum, Schwartz & Klein, 2018), gamification in nursing education (Oak, 2018), gamification in primary education for collaborative learning (Garcia-Sanjuan, Jardi, Jaen &Nacher, 2018), self-directed English learning to gamify teaching and learning process (Wan &Kim, 2018), gamification to support astronomy learning (Barringer, Plummer, Kregenov& Palma, 2018), gamified learning to assist microenterprises (Samonte, 2018), joyful learning of ‘Hujiang Happy Word Games' application to boost students’ confidence (He, Lee, Young &Chaing, 2018), employing Kahoot.it at the higher education level to foster and reinforce learning (Lin, Gianapathy & Kaur, 2018), development of a gamified vocabulary curriculum based on Bloom’s taxonomy to support students’ mastery of learning (Kingsley &Grabner-Hagen, 2018), gamification approach to improve students’ motivation and attitudes towards language learning (Wichadee&Pattanapichet, 2018), review on the effectiveness of using computer game-based foreign language learning to teach vocabulary successfully (Kacetl, 2018), gamification to make learning more fun and engaged (Filippou, Cheong & Cheong, 2018), polytechnic students’ evaluation of game-based vocabulary learning (Zou, Wang, Xie&Kohnke, 2018), proposal of competitive gaming embedded with personalised learning to reduce anxiety to learn vocabulary (Wei, Kao, Lu & Liu, 2018), digital badges-and-points have significant effect on improving students’ learning and they exhibit positive behaviour (Homer, Hew & Tan, 2018), gamified learning using the Reading Battle to encourage students to read (Li, Mok, Cheng & Chu, 2018), development of an educational game called My-Pet-Shop to enhance self-regulated learning (Chen & Lee, 2018), using expert point cloud recogniser game to learn and understand Japanese language better (Udaja, 2018), teaching mandarin using gamification and some disadvantages of using gamification including answering quiz based on the clarity of each learning goal (Heryadi&Muliamin, 2016), ways of evaluating the implementation of game elements (Lopez & Tucker, 2017), proposal of a new model called ‘Appiahene Gamification Model (AGM) for programming purpose to achieve learning purpose (Appiahene, Asante, Kesse-Yew & Acquah-Hayfron, 2017),development of Kiner motion-sensing interactive system (KMIS) to boost elementary students’ vocabulary learning and it was recommended to adopt interactive games for a long term vocabulary retention (Pan, 2017), applying hybrid game-based apps to improve language skills and to measure learner’s motivation (Berns, Palomo-Duarte, M. et al. 2016), the use of Aurasma mobile application that the potential of augmented games to deliver a range of challenging language tasks for advanced learners (Richardson, 2016), 2016, games that have pedagogical benefits in foreign language teaching (Kuimova&Karpacheva, 2016), Kahoot.it as a means to improve students’ motivation (Zarzycka-Piskorz, 2016, teachers’ belief on the use of gamification (Sanchez-Mena, Parreno& Manzano, 2016), use gamification as a means to motivate learners achieve fluency (Jorge, 2015), role of gamification to assist adolescent to learn vocabulary better (Abram & Walsh, 2014), using WebQuest and gamification to allow
students master critical skills like applying, integrating and acquiring content area (Levitt & Joseph, 2014), game and play activity to leverage social activities (Reinhardt & Sykes, 2014).

Others

Motivation related articles (n=47/312) in gamification plays a significant role in motivating learners to be more motivated towards their learning. There are two categories of motivation namely extrinsic motivation which refers to the performance based on an activity for a set outcome that usually have an impact on learner from outside. Intrinsic motivation refers to learners’ self-desire and urge to face new challenge or gain knowledge to satisfy and fulfil a self-desired task willingly. The past researches showed that many studies focus on students’ motivation where gamification is concern. The following are studies reviewed on motivation: (Topirceanu, 2017; Adukaite, Sebnem & Cantonii, 2017); Wichadee & Pattanapichet, 2018; Zainuddin, 2018; Fitura & Chmielarz, 2019; Lynette, 2018; Tan et al., 2019; Chen, Tseng & Hsiao, 2016; Hwa, 2018; Aseriskis & Damasevicius, 2014; Chong, 2019); Mohsen & Sepideh, 2017; Solmaz & Cetin, 2017; Meng-Hua, Tseng & Yuan, 2018; Hung, 2018; Høj-jet al., 2019; Udjaja, Yogi, 2018; Aktekin, Çelebi & Aktekin, 2018; Almeida & Buzzády, 2018; Piskorz, 2016; Hanson-Smith, 2016; Byun & Joung, 2018; Viswanathan & Radhakrishnan, 2018; Tan, Gananapathy & Mehar Singh, 2018; Tan, 2018; Iaremkenko, 2017; Ismail et al., 2018; Ouariachi, et al., 2017; Looyestyn, et al., 2017; Glowacki, Kruikova & Avshenyuk, 2018; Smith et al., 2015; Raftopoulos, 2014; Kelley & Johnston, 2012; Yates & Lanyi, 2015; Castro-Sánchez et al., 2016; Fuchs, 2014; James, 2018); Ho, 2019; van Roy & Zaman, 2018; Zainuddin, 2018; Hung, 2018; Kang & Kusuma, 2020; Martin, Richa & Klein, Andrew, 2017; Su, 2016; Zarzycka-Piskorz, 2016; Hasegawa, Koshino, & Ban, 2015; Kirci & Kahraman, 2015).

4. Discussions

This section explains three key points gleaned from studies reviewed. After conducting and developing preliminary search of the existing materials into critical perspective and taxonomies, this section strives to summarise some motivating and interesting points generated and included in the existing literature. The main key points selected for discussion in this section are summarised into four key points, namely motivations, challenges, recommendations and novel emerging trends. These discussions are crucial and significant to be addressed to future researchers on the issues and challenges they may come across so that they are equipped with the necessary knowledge and actions to face these challenges. One of the most common issues gleaned and found from the literature was educators’ beliefs and efficacies on traditional methods of teaching that disengage them to explore gamification to the next level (Azman & Yunus, 2019; Iyawa et al., 2019; Yang, Quadir & Chen, 2019; Dele et al., 2019; Lee et Al., 2018; Brunvand & Hill, 2018). Consequently, there is a great concern for the future researchers to probe further into this domain of the social sciences and Information and Communication Technologies (ICT), reflect on educators’ hesitant to break away from the traditional methods of teaching before they can blend teaching with the emerging technologies including gamification, game-based learning and serious games. The same is viewed for challenges and novel emerging trends. Motivations driven reasons play another crucial role in informing future researchers the reasons behind studies conducted by scholars into domains like social sciences, information and communication technologies (ICT), Computer and Educations that led and guided the to study gamification. Recommendations is the last section in the discussion that will show the relationship between past researchers and the current studies. Based on the previous researches reported by the researchers, the significance, gap and research interest presented will guide future researchers to carry out, experiment and report similar category of studies. Hence, this study paves a platform for the future researchers to develop their study based on the previous studies to drive gamification to the next level that would benefit educators, stakeholders and others.

Challenges

This section explains the occurring challenges discovered in gamification studies across different domains as shown in the previous taxonomy in (Figure: insert the figure here). The challenges outlined here are expanded as they have been extracted from various domains and sorting them accordingly has been a laborious process. The challenges presented and reported here based on their overall importance.

Challenges Linked in Terms of Addressing the Research Gap

Research is carried out to gain new knowledge and based on the scientific method, scholars are able to find solutions to a problem. After conducting an exhaustive systematic review on gamification, the gap was not apparent and this limited the space and breakthrough for contributing new research Coleman & Money, 2020; Iyawa et. al., 2019; Cerezo, Calderon, & Romero, 2019; Punar & Kaya, 2019; Suprapto, & Irrahali, 2018; Dele et. al., 2019; Lee et al., 2018; Brunvand & Hill, 2018). Consequently, there is a great concern for the future researchers to explore gamification to the next level (Azman & Yunus, 2019; Iyawa et al., 2019; Yang, Quadir & Chen, 2019; Dele et al., 2019; Lee et Al., 2018; Brunvand & Hill, 2018). Consequently, there is a great concern for the future researchers to probe further into this domain of the social sciences and Information and Communication Technologies (ICT), reflect on educators’ hesitant to break away from the traditional methods of teaching before they can blend teaching with the emerging technologies including gamification, game-based learning and serious games. The same is viewed for challenges and novel emerging trends. Motivations driven reasons play another crucial role in informing future researchers the reasons behind studies conducted by scholars into domains like social sciences, information and communication technologies (ICT), Computer and Educations that led and guided the to study gamification. Recommendations is the last section in the discussion that will show the relationship between past researchers and the current studies. Based on the previous researches reported by the researchers, the significance, gap and research interest presented will guide future researchers to carry out, experiment and report similar category of studies. Hence, this study paves a platform for the future researchers to develop their study based on the previous studies to drive gamification to the next level that would benefit educators, stakeholders and others.
Challenges Related to Study Population

The challenges outlined in this section discussed the small number of samples and population reported based on the past studies; other issues were also investigated in relation to gamification which comprise a small sample size as extracted in the reviews Daungcharone, Panjaburee\&Thongkoo, 2020; Cechetti, 2019; Bal, 2019; Chen, Li, Lee & Chu, 2019; Pinar & Kaya, 2019; Barringer et al., 2018; Yang, Lin & Chen, 2018; Soraya et al., 2019; Dafit, Sumardi\&Asib, 2019; Lam, Hew & Chiu, 2018; Muhammad et al., 2018; Rachels \& Rockinson, 2018; Ismail et al., 2018; Wichadee, \& Pattanapichet, 2018; Soboleva et al., 2018; Abu Bakar et al., 2018; El Kah\&Abdelhak, 2018; Yuen, 2018; Al-Hamoud, 2018; Filippou, Cheong \& Cheong, 2018; Talaei, 2018; Chen \& Lee, 2018; Zou et al., 2018; Lo \& Hew, 2018; Chen \& Lee, 2018; Vlachopoulos\&Makri, 2017; Hadi, 2017; Ebrahimzadeh\&Alavi, 2017; Pitura\&Chmielarz, 2017; Purgina, Mozgovoy\&Ward, 2017; Kammardsiri, 2017; Prandi et al., 2016; Yong \& Min, 2016; Kammardsiri, 2016; Liu, Holden \& Zheng, 2016; Michael, Arpad \& Cecilia, 2016.

Challenges Related to Data Collection

This challenge refers to the interference of the educators in determining the success rate of implementing gamification in the context of their study. The most common interference is when most of the studies reviewed focused on inducing game elements in pedagogical context. Most studies focused on cultivating game elements such rewards, badges, intrinsic and extrinsic motivation. The educators, teachers and curriculum developers voice are heard but the students’ perceptions and voices did not emerge or surface across the literature. Most of the data obtained were from experimental research studies that required the computation of scores rather than obtaining students’ feedback, views, or perspectives. Researchers’ voice or suggestions (Anoual\&Abdelhak, 2018; Inwood, 2014), Medina \& Hurtado, 2017; voluntary participation from the public to join serious game (Swiatek\&Gorsse, 2016; Tanya \& Eric, 2012), guidelines for serious games users (Marigo, 2014; Marini et al., 2017), framework and ethical guide to gamification (Gallagher et al., 2019; Hamada \& Wakabayashi, 2014), development of apps to improve undergraduates’ apps (Smith et al., 2015; Kiric\&Kahraman, 2015; Frank \& Philipp, 2016), demonstration of higher achievement based on gamification (Byun \&Joung, 2018; Glowacki, Yelizaveta \& Nataliya, 2018), gamification increase students’ engagement (Aktek, Celebik\&Aktek, 2018; Turan\&Meral, 2018; Looyestyn et al., 2017; Cook, Gremo\& Morgan, 2017; Song \& Sparks, 2017), positive communication (Ouariachi et al., 2017), positive attitude of students (Birch \& Woodruff, 2017), behaviour (Edwards et al., 2016), improvement in academic (Tantawi, Sadaf \&Alhumaid, 2018; Turan\&Meral, 2018), learners’ personalities (Denden et al., 2018), proposing gamification approaches (Almeida \&Buzady, 2018; Sok\&Ryeol, 2018; Ozdener\&Demirci, 2018; Hung, 2018; Viswanathan \& Radhakrishnan, 2018; Letizia, 2017; Baptista \& Oliveira, 2017; Rosales et al., 2016; Lane, 2014), motivation (Tan, Ganapathy \& Singh, 2018; Ismail et al., 2018; Tan, 2018; Iaremenko, 2017; Hanson, 2016; Piskorz, 2016), emotional competences (Irac, Pathak \&DeRosier, 2019; Moreno, Cabello \&Filella, 2018).

Challenges Related to Findings

This challenge refers to the findings gathered based teachers’ knowledge and understanding integrating gamification in the classroom. Some of the reviews mentioned that teachers who lack the knowledge may delay their learners’ learning process (Yunues\& Azman, 2019), gamification allows for utilization of different technology namely Socrates, Kahoot and Plickers which were found to be very entertaining but findings focused less on the content of the courses taught in the university (Solmaz\& Cetin, 2017), range of age that is being understudied (Blumberg et al., 2019; kayimbasioglu, Bora \& Huseyin, 2016; ), bias towards gender where by focus was given only on male students (Engerman, MacAllan\&Chellman, 2018), use convenience sampling but findings cannot be generalised (Sanchez, Parreno\& Manzano, 2016), limited samples (Rocha, 2019), quasi-experimental research design (Park, Kim, Kim \& Yi, 2019; Wei et al., 2018; Zainuddin, 2018; Zi, 2018; Wichadee \& Pattanapichet, 2018; Hung, 2016; Yong \& Min, 2016; Chi, Benazir \& Shing, 2019), time duration allocated for one player (Yong \& Min, 2016), gamification that need more attention infusing software process improvement by organizations (Alhammad\& Moreno, 2020), teachers’ hesitation to be confident using gamified...
Motivation

This section reports the reasons or motivations discovered from the literature that motivated researchers from various disciplines to induce gamification. These motivations have been categorized based on their importance as shown in (Figure 2)

Motivations Related to Rampant Development of Technology

The rampant development of technology has enabled the immersion of playful and excitement of gamification, game-based learning and serious games. Gamification is made possible with the support of different application, devices and software where students, teachers, educators, stakeholders and others can connect and interact with one another. New advancements in information and communication technologies and use of mobile applications have pave ways for teachers and students to be resourceful and apply strategies for gamification classrooms. Gamification has pollinated software development in selected courses like engineering for best practices, socialization and improves students’ knowledge. Some researchers carried out studies in gamification for various reasons, which consist of facing challenges to initiate software process development (Alhammad&Moreno, 2020), using mobile gaming technologies (Thongkoo,Panjaburee&Daugncharone, 2020; Tamtama, Suryanto,&Suyoto, 2020; Elaish et al., 2019; Singh et al., 2019; Mozgovoy& John,2019; Soraya et al., 2019; Pham & Chen, 2018; Lee et al., 2018; Elaish et al., 2018; Iyawa et al., 2019; Samur, 2018; Samonte, 2018; Aliah, Ahmad &maksom, 2018; So et. al., 2017; Elmiligi, Ramirez&Walton, 2016;Richardson, 2016; Heryadi&
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Kelvin, 2016; Prandi, Mirri, Salomoni&Mazzoni, 2016; Yang,Yang& Wu, 2014) or digital media (Gekker, 2018), or digital game (Lee, 2019; Barringer, Plummer, Kregenow& Palma, 2018; Martin et al, 2018; Yang, Lin & Chen, 2018; Zinnen, &Godehardt, 2018; Wichadee&Pattanapichet, 2018; Tshering et al., 2018; Stapinski et al., 2017; Ebrahimzadeh,&Alavi, 2017; Reinhardt & Sykes, 2014), combination of technology and information and communication technologies to enhance academic gain (Xanthopoulos&Xinogalos,2018; Appiahene, 2017; Klimova, Blanka&Kacet, 2017; Levitt &Piro, 2014), android application for users (Suprapto&Irrahali, 2019; Kirci&Kahraman, 2015), development of software for educational purposes (Purgina, Mozgovoy, & Ward, 2017; Kuhn & Stevens, 2017; Chubarkova et. al., 2016; Gomez, 2016; ), using m-learning app to boost undergraduates’ soft skills (Smith, Bille, Southgate,&Stephens,2016), using virtual reality induced with gamification to train students’ to improve their communication skills (Lopez& Tucker, 2017;Ruiz et a., 2017; Lochmann, 2016), virtual learning and gamification (Al-Azawei, Baiee& Mohammed, 2019), educational games (Mogrovejo, Mamani, & Tipo, 2019; Homer, Hew & Tan, 2018; Chen & Lee, 2018; Muller et al., 2017; Miladi et. al., 2017; Al-Azawi, 2017), teaching using instructional video games to enhance vocabulary (Abbasi , 2018; Hadi, 2017), creation of taxonomies that serve as guide for serious games (Yanes&Bououd, 2019;Preito& Medina, 2016), elements of gaming in video games to assist teenagers’ acquire informal learning (Coleman & money, 2020; Matijević&Topolovčan, 2019).

**Motivations related to Rampant development of technology**
- Information and Communication Technologies
- Mobile applications
- Software development
- Virtual reality

**Motivations related to Education**
- Beyond traditional approaches
- Embrace innovative pedagogy
- Formative assessment
- Curriculum

**Motivations related to new generation**
- Gen Z

**Motivations to teachers**
- Beliefs

**Motivation to students**
- Engagement
- Self-efficacy
- Achievement
- Motivation
- Confidence
- Interaction
- Participation
- Scaffolding
- Learning
- Learning outcomes and goals
- Positive attitudes
- Autonomy
- Anxiety
- Team work
- Transformative skills
- Emotional intelligence

**Motivations Related to Education**

Game-based studies have grown and revolutionised information technology and education. Many studies have embraced mobile education to teach language and one of them is mobile-based learning and gamification (Mikasyte, 2018; Pelser-Carstens; Veruschka, Blignaut&Seugnet, 2017; Marengo &Ladisa, 2016; ), ICT for knowledge acquisition (Ward &Mozgovoy, 2019; Kayimbasioglu, Oktekin&Haci, 2016), to improve second language acquisition (Jorge, 2015), integration of gamification with the 2st century skills learning (Kingsley& Grabner2015), moving away from traditional method of teaching to intelligent game-based learning for people
with hearing impairment (Azman & Yunus, 2019; James & Mayer, 2018; Brunvand & Hill, 2019; Kammardsiri et al., 2016; Kammardsiri, Khwuthiyakorn & Wongta, 2016), formative assessment (Zhao, 2019; Chen et al., 2018; Martin & Klein, 2017; Andrew, 2017), stem and game-based learning (Vate & Poonosri, 2015), combination of a role-playing approach with gamification (Topireaneau, 2017), infusion of computer assisted language learning (CALL) with gamification (Stoakley & Kim, 2017), flipped classroom and gamification to promote critical thinking (Pinar & Kaya, 2019; Wang, 2019; Lo & Hew, 2018; Hung, 2016), game-based and problem solving skills to learn mathematics (Pratama & Setyaningrum, 2018), personalise assistance strategy with gamification (Zou et al., 2018; Wei et al., 2018), gamification and Massive Open Online Course (MOOC) (Abu Bakar, Yusuf & Ahmad, 2018), embedding gamification elements to design appropriate methodological and strategies to be included in the curriculum (Schneider & Ackels, 2019), Martin et al., 2018; Kingsley & Hagen, 2018; Soboleva, Galimova, Maydangalieva & Batchyeva, 2018), using blended learning with gamification to make learning more engaging and meaningful (Zhou et al., 2019; Lam, Hew & Chie, 2018), integration of gamification and personality known as Hybrid learning model (Kang & Kusuma, 2020), combining joyful learning gamification that would promote effectiveness in learning (He, Lee, Young & Chiang, 2017), playful learning (Whitton, 2018), implementation of mobile game-transformed lecture-based approach (Thongkoo & Panjaburee, & Daungcharone, 2020), self-directed learning and gamification to improve students’ learning (Won & Kim, 2018), collaborative learning and gamification (Garcia et al., 2018), technology based game (Putura & Terlecka-Pacut, 2018), gamification to promote game-centric curriculum design and active learning (Martin et al., 2018).

Motivations Related to New Generation

This challenge describes the motivation related to new generation whereby it is important to find out the acceptance level of gamification by students. Gamification makes learning more meaningful as it offers fun and engagement in learning (Low, Yap & Sarwar, 2018; Talaei et al., 2018; Filippou, Cheong & Cheong, 2018; Song & Spark, 2017).

Motivations to Teachers

Teachers’ beliefs on gamification and how it can influence their attitude and intention to apply gamification in the classroom (Blume, 2019; Fu et al., 2019; Adukaite & Cantoni, 2017; Sánchez, Parreño & Manzano, 2016).

Motivation to Students

This challenge related to motivation is important as it helps the teachers to support students to get motivated intrinsically and extrinsically where gamification is concern. The intrinsic motivation is activated when students are asked to perform a task and in return rewards would be given to recognise their contribution. Intrinsic motivation on the other hand, drives and leads the students internally when they accomplish tasks and take charge of learning. This is express through happy and positive feelings. Motivations to students are divided as follow: improve students’ confidence, participation, engagement (Coleman & money, 2020; Tamtama, Suryanto, & Suyoto, 2020; Cerezo, Calderón & Romero, 2018; Lucchiari et al., 2019; Elaish et al., 2019; Lee, 2019; Dele et al., 2019; Imlig-Itten & Petko, 2018; Ismail et al., 2018; Nguyen et al., 2018; Sun & Hsieh, 2018; Zainuddin, 2018; Van Roy & Zaman, 2018; Fahlrudinov, 2017; Al-Azawi, 2017; Muller et al., 2017; Yong & Min, 2016; Su, 2016), students’ efficacy attainable as they are more confident with their capabilities to achieve goals set for learning (Rachels & Rockinson, 2018), improve students’ learning achievement (Kang & Kusuma, 2020), boost students’ motivation (Thongkoo & Panjaburee, & Daungcharone, 2020; Tan, Ganapathy, M., & Singh, 2018; Irtaza et al., 2018; Klimova, & Kacet, 2018; Yuen, 2018; Filippou, Cheong & Cheong, 2018; Sun & Hsieh, 2018; Li et al., 2018; Udjaja, 2018; Esteves et al., 2018; Ebrahimzadeh, & Alavi, 2017; Topireaneau, 2017; Fahlrudinov, 2017; Pitura, & Chmielarz, 2016; Zarzycka, 2016; Kuimova & Karpacheva, 2016; Peterson, 2016; Berns et al., 2016; ), using interactive game to improve English (Purina, Mozgovoy, & Ward, 2017; Pan, 2017), the need to scaffold learning through video games (Sun et al., 2018; Newcombe & Brick, 2017), promote and enhance students’ learning (Hung, 2016), effect on learning outcomes, objectives and goals (Samonte, 2018; Talaei et al., 2018; Vlachopoulos & Makri, 2017; Viswanathan & Radhakrishnan, 2018), gamification fosters positive attitudes on students upon learning the subjects (Wichadee, & Pattapanichet, 2018), teachers through gamification are able to provide more autonomy to students as they are engaged in the learning process (Kingsley & Hagen, 2018), effects of game on students’ anxiety (Yang, Lin & Chen, 2018), gamification provided opportunities for medical students to work in team cultivating habits to answer questions asked (Mosalanejad, Razeghi & Ifard, 2018), fostering the development of transformative skills among students (Cruz & Oliveira, 2018), fostering emotional intelligence among students (Yang, Quadir & Chen, 2019).
Recommendations

This section reports the part of the reviewed literature that recapitulates past researchers’ recommendations for future directions. The recommendations were divided and categorised according to their significance as illustrated in (Figure 3).

Related to Research

Researchers throughout the world are aware of the fact that gamification is maturing and finding its place across many disciplines. These researchers and their contributions in terms of research findings have made some promising recommendations despite mixed and varying disputes based on gamification. Among some of the influential recommendations include to shift focus and rely less on quantitative studies and conduct more studies specifically on mix-methods (Tantawi, Sadaf & Alhumaid, 2016; Alsawaler, 2019), propose critical enquiry as a new of methodology for studies related to data mining, texts, translation, libraries, climate change, ideologies, museum, that require fusion of game elements to attract learners’ attention (Cengiz, Birant & Derya, 2017; Ouariachiet al, 2017; Swiatek & Gorse, 2016; Kidd, 2015; Inwood, 2014; O’Hagan, 2012,); to add suitable evaluation processes to test outcomes obtained from the research conducted to monitor behaviour (Sanchez et. al., 2016). Among hot topics that need more attention specifically under serious games to focus social well-being of elderly people (Jinhui et al., 2018), to conduct more exploratory studies (Kelley & Johnston, 2015), recommendation to have more governance platforms for serious games for citizens (Kelley & Johnston, 2015), careful development of gamification that retains its values (Marini et al., 2018; Raftopoulos, 2014), provide clear and direct guidelines to develop successful serious games (Hamada & Wakabayashi, 2014), development of m-learning to support literacy education (Smith et al., 2015), mobile education for primary school students (Kirci & Kahrman, 2015), generate innovative approaches in education with gamification (Birch & Earl, 2017; Glowacki, Kriukova & Avshenyuk, 2018; Hung, 2018), more rigorous study designs required to examine the effectiveness of gamification and benefits that can gained (Tantawi, Sadaf & Alhumaid, 2016; Looyestyn et al., 2017), behaviour change to improve health outcomes (Gallagher et al., 2019; Edwards et al., 2016), to conduct more studies infusing games and electric energy consumption (Nishida & Braga, 2015), educational psychology modelling learners’ personalities (Denden et al., 2018), effects of gamification on society and culture (Lifaniva, 2016) and to strike balance between content of the course and game elements (Inwood, 2014).

Related to Data Analysis

Data analysis is deemed as one of the most imperative aspects in gamification studies. Past researchers have deliberated their recommendations for future studies that should consider applying new and different approach to data techniques; some recommended the application of more data analysis subjective measures that would require qualitative analysis (Ozderen & Demirci, 2018; Ismail et al., 2018; Turan & Meral, 2018; Song & Sparks, 2017); employ structural equation modelling (Baptista & Tiago, 2017). Crewell (2014) divulged that the effectiveness of a study cannot be relied solely on quantitative data sources like surveys and game metrics. Gamification is implemented to bring about effective results and improvement of the users who are also the students. Therefore, users’ or students’ rich learning experiences or perceptions of the gamification elements embedded can also be captured through interviews, classroom observations and document analysis. Data analysis has to be supported with the theoretical claims or foundation to substantiate the findings (Creswell, 2014).

Related to Improving Children Outcome

Pre-school children outcomes have driven the researchers to carry out studies in gamification and also recommend continuation of studies for future directions. This recommendation particularly highlights sections of the literature by highlighting how the elements of the gamification affects pre-school children who are dyslexics with different learning abilities (Elkah, 2018). This impact has drastically hindered the children to progress in terms of academic achievement and abult their social life. Games in other words, have assisted learning and build motivation for children who are dyslexics with different learning abilities to acquire literacy skills. (Elkah, 2018). Educational learning games have assisted pre-school children to develop reading skills (Hooshayar & Lim, 2017), learning o music among children (Almeida & Buzády, 2018), elementary learners learning vocabulary (Fu, 2017), cognitive development of children aged 9-12 years old (Imlig & Petko, 2018), emphasis on learning goals and behaviour (Homer, Hew & Tan, 2018), memory retention (Yunus & Azman, 2019), enhancement of self-efficacy (Solmaz & Cetin, 2017).
Recommendations to Improving Teachers’ Practice

Training initiatives for teachers teaching foreign languages (Letizia, 2017) as to keep them abreast with latest immersive gamification technology, lecturers who plan to induce gamification elements (Wang&Lv, 2018), teachers’ roles and beliefs in using gamification (Sanchez, Marti-Parre&Aldás, 2016), pedagogical practices (Hung, 2018).

Others


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5. Conclusion

Research studies in relation to gamification have increased ever since of its introduction. However, the studies carried out pose some limitations which are yet to be argued and answered. Gamification is it in educational context or across domains has gained growing attention and acceptance throughout the globe. This article is significant in terms of its contribution to works related to gamification that have been categorised accordingly. Many interesting categories patterns emerged in relation to gamification studies reviewed. The articles reviewed were categorised into gamification, game-based learning, serious games, novel emerging trends
and others. The selected articles were gleaned and critically analysed as to highlight the challenges, motivations and recommendation in relation to gamification, the gaps of the studies were also discovered through data analysis. This study implicates various recommendations that are beneficial for future researchers. The findings of this study would benefit pre-school teachers, primary school teachers, secondary school teacher, tertiary students, teachers and lecturers from various disciplines, researchers, curriculum developers, policy makers, government officers and other stakeholders. The recommendations given will function as a guideline for future researchers to keep in mind of the uncertainties and challenges that they may come across while carrying out studies relating to gamification. Most of the challenges reported are associated with implementation of gamification elements at different levels of schooling, selection of data collection, sampling and population, values of using gamification in respective course of study and other related problems. This study is a breakthrough that would assist valuable source of reference for future researchers.

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