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Review Article

Exploring the impact of gamification on skill development in special education: A systematic review

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ABSTRACT

Special education settings have experienced technological innovation that have advanced the development of various skills. Gamification is increasingly used to enhance the skills of individuals with special needs. There have been some studies and limited systematic reviews of gamification in general and special needs settings in particular, however, gamification design applied to special needs lacks a comprehensive systematic review. This article conducts a Literature review of gamification in special needs settings to investigate the effect of gamification in special needs as well as to identify gamification domains, groups and trends for individuals with special needs. Valuable data has been highlighted concerning the technology techniques used in enhancing the skills of individuals with a disability. However, further studies are still needed to examine areas, where research is lacking in the gamification field. The preferred reporting items for literature reviews and meta-analysis PRISMA standard was adopted for inclusion and exclusion criteria' in this study such as including, eligibility, screening, dentification, and inclusion and exclusion steps. The results revealed that gamification design facilitates the development of various skills among individuals with special needs. Additionally, gamification design was mostly used to enhance the learning skills of individuals with a disability.

Keywords: special needs, gamification, literature review, outcomes

INTRODUCTION

In recent times, the development of digital technology has made it possible to increase the range of learning alternatives, which has brought about innovations learning and teaching (Jdaitawi, 2019, 2020a, 2020b; Jdaitawi & Kan'an, 2022; Manzano-Leon et al., 2021; Muhaidat et al., 2022; Rasheed et al., 2021; Soliman et al., 2022). In special education, unique teaching and learning strategies are needed for the facilitation of learning and skills acquisition of individuals with special needs, including the acquisition of communication and behavioral skills (Baragash et al., 2019; Cifuentes et al., 2016; Jdaitawi & Kan'an, 2022; Jdaitawi et al., 2022a, 2022b; Manzano-Leon et al., 2021). Various individuals all over the world have disorders, either cognitive or physical, which call for increased assistance during their learning process (Adam & Tatnall, 2017; Baragash et al., 2019; Eldenfria & Al-Samarraie, 2019).

Gamification has been found to be useful in promoting different types of skills, including educational, psychological and social skills (Zainuddin et al., 2020; Zimmerling et al., 2019). Studies have been conducted to identify the benefits, opportunities and challenges experienced by students in the application of gamification in the education field (Zainuddin et al., 2020). Among these studies is the meta-analysis of Kalogiannakis et al. (2021), involving 24 research papers published from 2012 to 2020. The authors revealed the considerable impacts of gamification on the motivation and engagement of students, their learning outcomes and social interaction. According to Cakir and Korkmaz (2019) and Hursen and Bas (2019), providing a structured and enriching learning environment would allow students with special education needs to develop life skills and other skills, and thus, gamification needs to be developed to further assist these students.

In a more recent study, James (2020) found gamification to be effective in integrating individuals with a disability into society; this holds true for students with disability who find it difficult to relate to traditional learning approaches as gamification is able to minimize their academic labor (James, 2020; Ronimus et al., 2019). Gamification elements like points, badges and leader boards have been shown to motivate students, which enhances their learning performance (Tasadduq et al., 2021). Additionally, gamification furnishes students with disability with the required attention, sparking their interest in the tasks and improving their learning confidence (Wajiuhullah et al., 2018). Moreover, game-based learning assists intellectually students with disability with academic learning activities while at the same time enhancing their problem-solving skills and change adaptation skills (Spires, 2015).

Furthermore, individuals with a disability and those with long-term physical, mental or intellectual impairments find it challenging to learn and this stops them from contributing to and participating in society (Leonardi et al., 2006, p. 1220). The present review of studies on gamification's application in special needs education highlighted the technique's benefits for students, including support for their motivation, social interaction and achievement (e.g., Saridaki & Mourlas, 2013; Smith & Abrams, 2019; Tsai et al., 2020).

In this line of study, authors have explored the role of gamification in improving the skills of students with disability (e.g., Mubin et al., 2020; Navan & Khaleghi, 2020). To begin with, Mubin et al.'s (2020) meta-analysis evidenced the effectiveness of gamification in autistic students' group interactions, while Gooch et al. (2016) examination of gamification revealed its potential in improving various autistic students' skills, making it a potential technique for motivating these students to improve their literacy skills. Nevertheless, these studies have provided minimal information as to the effect size of gamification's impact in the special needs context. One review showed that gamification in special needs settings has been focused mainly on autistic individuals, underlining the need for more studies to extensively examine the subject. None of the studies differentiated between different types of skills and abilities, as a result of which gamification's effectiveness and its role in special needs settings remains unclear (Mubin & Poh, 2020; Mubin et al., 2020).

More importantly, gamification's application to individuals with disabilities is a relatively new field of study, as reflected by the limited number of studies (Mubin & Poh, 2020; Mubin et al., 2020). There is a clear need to further examine the degree to which gamification can influence skills development learning among individuals with special needs, in particular cognitive, social, personal and learning skills, which are essential for group participation. Hence, this study conducted an analysis and review of published studies to highlight this need and provide information concerning the top skills that can be acquired through gamification.

Gamification Definition

Gamification refers to the use of game thinking and mechanics to satisfy non-game ends (Folmar, 2015, p. 2). Specifically, gamification is not merely making a game but imparting a lesson, in such a way that game thinking is applied to impart the lesson and to develop it on the basis of the players' feedback (Folmar, 2015, p. 5). However, no consensus has been reached on the term's definition among researchers, as the knowledge basis connecting gamification to theoretical principles is flimsy, and empirical studies based on theoretical principles are still few and far between (Alsawaier, 2018). The lack of research is due to the novelty of gamification as a technique, particularly in the field of education (Alsawaier, 2018). Despite the criticisms for its application as a technocentric notion that comprises content for digital technology, gamification reflects a social phenomenon stemming from a generation of individuals who are digitally literature (Alsawaier, 2018). Studies in this line have presented its benefits, including flexibility, easy access, the introduction of critical thinking skills and the achievement of positive outcomes through which motivation, participation, engagement and collaboration are promoted (Vanduhe et al., 2020). According to Stiegler and Zimmerman (2015), these factors are the main ones exploited in gamification for learning and training enhancement.

Gamification in Special Needs Setting

Recent research has examined the role of gamification in assisting learning among people with disabilities (Tsikinas & Xinogalos, 2018) and has proposed a strategic design that includes the entire students bodies in the game environment, including those living with disabilities. According to Tsikinas and Xinogalos (2018), games-based learning facilitates the enhancement of social and communication skills among students with disability, along with cognitive and conceptual skills. In essence, those with special needs were referred to by Leonardi et al. (2006) as those possessing long-term physical, mental, intellectual or sensory impairments; they are those who face interaction barriers that prevent them from participating fully in society with the rest of its members, who are not suffering from disabilities (p. 1220).

A review of gamification literature in the special needs field showed its role in supporting cognitive and intellectual skills (Stancin et al., 2020). In addition, gamification positively impacts intellectually disabled and autistic individuals (Jiménez et al., 2015; Tsikinas & Xinogalos, 2018). On the above basis, the authors found that a literature review of gamification studies for special needs was confined to few categories (intellectual disability and autism) disregarding others. Hence, studies need to be carried out to include other groups as this reflects a gap in the literature. This study primarily aims to conduct a meta-analysis of past literature on gamification's effectiveness in enhancing the acquisition of learning skills in individuals with special needs. Therefore, the following research questions were developed:

1. To what extent does gamification help individuals with special needs?
2. In which domain of special needs is gamification the most effective?

RESEARCH METHOD

The literature review technique adopted in this study is based on PRISMA review protocol, which involves search strategy, studies selection and data extraction and analysis as suggested by Liberati et al. (2009). Only a few studies have been carried out in special education settings regarding gamification implementation. The question arises whether the use of gamification as a prevention strategy in skills learning would bring about the full practice of life activities among special needs individuals. This question needs to be addressed through a meta-analysis of gamification studies focused on the topic.

Inclusion and Exclusion Strategy

In terms of the section of gamification empirical studies, this study used PRISMA standard to make a systematic selection aimed at special needs settings. First, the study includes all empirical studies conducted in special needs settings that introduced several types of needs, including mental, intellectual, cognitive, autistic and learning disabilities, and that were published between 2015 and 2022. Second, applying the eligibility method, this study reviewed those studies found in specific database, namely Web of Science, SCOPUS, and Elsevier. Third, a screening method was used to identify studies by using certain keywords, such

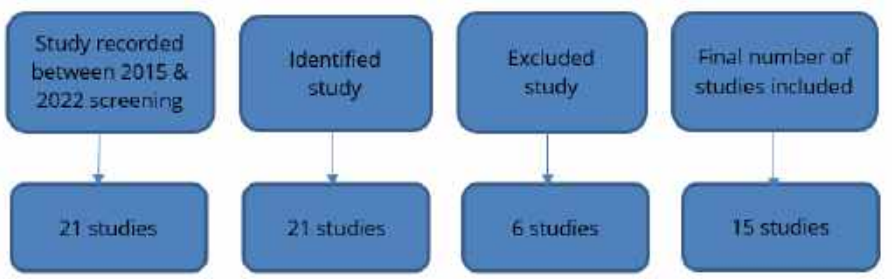

Figure 1. Flowchart describing the data collection process (Source: Authors)

as 'gamification' 'game-based' 'special needs' and 'disability' to search the databases. The identification method indicated that 21 studies were reviewed and identified through the literature. Finally, of these 21, studies, 15 met the criteria (written in English, included special needs participants, etc.), while six did not because they were either published in other databases, were conference papers or hold unclear outcomes as shown in **Figure 1**.

RESULTS

Beginning with the question concerning gamification outcomes in special education settings, **Table 1** presents the finding that gamification activities enhanced various skills among students with disability. Most of the reviewed studies supported the effectiveness of gamification as a tool in improving cognitive outcomes and the learning, social and interaction skills of the students (e.g., Contereras et al., 2019; Dandashi et al., 2015; Durango et al., 2018; Fridenson-Hayo et al., 2017; Kang & Chang, 2019; Ronimus et al., 2019). With regard to the question pertaining to the domains, seven studies were about learning skills, constituting 46.66%, five were about cognitive skills, constituting 33.33%, two were about personal and behavioral skills, constituting 13.33%; while the last one was about life skills, constituting 6.66%.

DISCUSSION

This study's main objective was to establish the effectiveness of gamification in enhancing the skills of special needs students, through a review of existing studies. 15 selected studies indicated support for the positive outcome of gamification in promoting individual skills (Durango et al., 2018; Kuswardhana et al., 2017). On the whole, the study results highlighted the significant influence of gamification and its positive role in enhancing special needs students' skills, with the majority of such studies focusing on learning skills and cognitive skills and the rest focusing on personal, behavioral and life skills. The study supported previous studies that found that gamification enhanced several skills among individuals (Davis et al. 2018; Hew et al., 2016; Stancin et al., 2020). Thus, it can be stated that gamification facilitates students learning through creating fun activities that encourage individuals with special needs to participate in the activities. Davis et al. (2018) indicated that gamification techniques can stimulate students engagement, which helps them to enjoy the learning activities and interact with others in the activities.

Additionally, gamification techniques have been found to promote positive learning, attitudes and develop other skills among students with disability. In particular, Shabalina et al. (2020) stated that games enable individual with severe intellectual disabilities to develop their everyday learning life skills. Scardovelli and Frere (2015) also found that gamification positively impacted children's satisfaction. Thus, the authors showed that gamification enhanced several skills among individuals with disabilities including learning, cognitive and behavioral skills as well as life skills. The study provides a clear overview of the effectiveness of gamification in facilitating the academic, cognitive, life and social skills of individuals with special needs, showing that gamification makes a positive contribution to students emotions, motivation, engagement, attitude, and ultimately learning performance. The study can be useful as research guidance for decision-makers who design programs for special needs individuals, such as people who are autistic or live with behavioral or intellectual disabilities.

Table 1. Results of the studies on gamification in special needs settings

Author (s)	Special needs category	Outcomes	Age	Domain
Demir (2022)	Intellectual disabilities	Improve education of students	High school	Learning
Dandashi et al. (2015)	Intellectual disabilities	Improve students learning	Children age	learning
Navan and Khaleghi (2019)	Autism	Improve children education in recognize emotions	Children age	Learning
Kuswardhana et al. (2017)	Mild mental retardation	Enhanced children recognition skills	Children age	Cognitive skills
Kosmas et al. (2018)	Special education needs	Improved students memory skills & emotions usage	Elementary school students	Cognitive skills
Ronimus et al. (2019)	Reading difficulties	Improve students reading skills	Elementary school students	Learning & reading skills
Wajiuhullah and Ashraf (2018)	Intellectual disability	Improve students number concepts	School students	Learning & number concepts
Arenas and Cruz (2019)	Down syndrome	Improved students' academic performance	School students	Learning & behavior
Kim and Lee (2021)	Intellectual disability	Improve cognitive learning abilities	Children between 6-13 years old	Cognitive skills
Hulusic and Pistoljevic (2017)	Autism	Improved individual knowledge & learning	Children with autism	Knowledge & learning
Arzone et al. (2020)	Autism spectrum disorder	Change in pupils emotional intelligence	Pupils with autism	Emotional intelligence
Fridenson-Hayo et al. (2017)	Autism	Improve learning about emotions of students	Children	Learning ability
Scardovelli and Frere (2015)	Motor disabilities	Positively impacted children satisfaction	Children	Satisfaction
Andrade and Costa (2020)	Down syndrome	Improve students learning concept of dengue	Students	Learning
Chan et al. (2022)	Special education needs & deaf & hard of hearing	Improved language achievement	Students	Language learning

Regarding the second question, the results showed that gamification is most effective in improving the learning skills of individuals with disabilities. The reason for this may be that people believe that game techniques are not suitable for enhancing other types of skills. Another reason could be that the literature does not adequately cover the impact of gamification techniques in special needs settings. For instance, Stancin and Hoic-Bozic (2020) stated that gamification literature does not sufficiently cover the socio-emotional skills of people with intellectual disabilities, such as expressing feelings and establishing relationships with others. Furthermore, one of the recommendations made in a previous study (Alomari et al., 2019) was to inform students about the gamification techniques before they participate in gamified learning, and that could be inaccessible to students with specific disabilities, which limited its applications.

Limitations and Future Studies

One of the limitations of this study is that only 15 studies were reviewed, so there is a high probability that other important studies were excluded, and thus the applicability of the results may be limited to a specific setting. Future studies may examine gamification's use in other settings and subjects. Lastly, future studies may examine gamification's effectiveness in developing various skills among individuals with special needs compared with its effectiveness in developing the same skills among individuals without special needs.

Implications

This study focused on gamification's effectiveness in the field of special needs education. The literature review shows gaps regarding both the topic and the context (James, 2020). A literature review was conducted to highlight the status of gamification in the special needs setting, indicating a contribution to the literature dedicated to the subject. The review results showed that most of the studies revealed positive outcomes and supported gamification's role in meeting the requirements of special needs learning, particularly with regard to students social, cognitive and psychological skills. Based on the findings, gamification is useful in the development of such skills as it promotes students social interaction and engagement and develops positive attitudes towards learning.

CONCLUSIONS

Authors of future studies can use the findings of this study to guide them in their quest to further investigate gamification's effectiveness in enhancing the learning and skills of individuals with special needs. The study found gamification to be useful in supporting learning engagement, social engagement and other life activities of individuals with special needs and effective in promoting positive emotions and adaptation to social life.

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Data availability: Data generated or analyzed during this study are available from the authors on request.

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