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Experiential Learning Based on Computer Games

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Abstract: In today's digital age, computer games are emerging as a powerful tool to promote learning and the development of various skills. This paper examines the experiential learning potential of computer games, analyzing their impact on student motivation and engagement. Through a review of existing literature and empirical studies, the paper explores ways in which computer games can be integrated into educational curricula and used as effective learning tools. The study is based on the experiential learning theory of Kolb (1984) and other similar theories that emphasize the importance of direct experience and reflection in the learning process. The study analysis shows that computer games can not only increase students' engagement and motivation but also improve their learning experiences through interactivity and immediate feedback. In conclusion, the paper suggests recommendations for the effective use of computer games in education, emphasizing the importance of an approach used to ensure positive learning outcomes.

Keywords: Computer games, experiential learning, digital education, student motivation

Introduction

In the modern age of technology, digital games have taken on an important role in education, providing opportunities for interactive and engaged learning. Theories of learning from experience, applicable to learning based on digital games (Digital Game-Based Learning - DGBL), integrate the principles of experiential learning in the design and implementation of educational games through digital platforms. Digital games can guide players through Kolb's learning cycle, presenting reflective scenarios, encouraging conceptual understanding, and providing opportunities for active experimentation within the game environment.

When we apply experiential learning theories to digital game-based learning (DGBL), we integrate experiential learning principles into the design and implementation of educational games. Digital games can guide players through Kolb's learning cycle by presenting scenarios, and reflective decisions, encouraging conceptual understanding, and providing opportunities for active experimentation within the game environment. Experiential learning involves transforming experience into effective learning. Kolb's experiential learning theory emphasizes how our experiences, including our thoughts, emotions, and environment, influence the learning process (Kolb, 1984).

Kolb's theory defines learning from experience as a four-stage process:

- Concrete learning occurs when a learner has a new experience or interprets a previous experience in a new way.
- Reflective observation – the learner reflects on the new experience to understand what it means.
- conceptualization – the learner adjusts their thinking or constructs new ideas based on experience and reflection.
- Active experimentation – the learner applies their new ideas to real-world situations to test whether they work and to see if any changes need to be made. This process can happen quickly or for a long time.

Experiential learning theory emphasizes the importance of direct experience and reflection in the learning process. Games provide an opportunity for students to experience different scenarios and reflect on their decisions, leading to a deeper understanding of the content being taught (Nadeem, Oroszlanyova, & Farag, 2023).

Therefore, experiential learning theory and its principles provide a basis for integrating play and theory into learning. By adopting game-based learning, organizations can use technology to enable a modern version of experiential learning for students to master some of the challenges of learning in the 21st century. Game-based learning harnesses an adult learner's imagination by creating a world to explore that motivates them to repeat challenges, achieve learning outcomes, reflect on experience, and create new knowledge through transforming experience. the game. It is suggested that experiential learning can be used as a theoretical basis for game-based learning. The ultimate goal of game design for game-based learning is to create engaging experiences for learners. Experiences are the result of the interaction between the current situation and past experiences. This is one of the design principles of game-based learning (Odendaal, 2018).

Identification problem

In the context of traditional education, one of the main challenges is maintaining student engagement and motivation. Recent research shows that conventional teaching methods often fail to engage students sustainably and effectively, leading to decreased academic performance and interest in learning (Nadolny et al., 2020). A large number of studies have revealed that the lack of interactivity and

adaptability of learning to students' interests and lifestyles contributes to this problem (Schindler et al., 2017).

Purpose of the study

This study aims to explore the impact of digital game-based experiential learning (DGBL) on student engagement and motivation. By analyzing the use of technology and digital games in the educational process, the study will provide insight into the effectiveness of these methods in improving academic results and increasing student engagement (Boyle et al., 2016; Hamari et al., 2016).

Research objectives

- To determine the impact of digital games on student engagement and motivation.
- To analyze the benefits and challenges of using digital games in education.
- To offer recommendations for the integration of digital games into educational curricula.

Literature Review

Recent research shows that digital games have a significant positive impact on student engagement and motivation. According to a study conducted by Qian and Clark (2019), digital games significantly increase the level of student engagement, creating a learning environment that is more interactive and engaging. The authors point out that educational games can improve knowledge acquisition and help develop critical thinking skills (Qian & Clark, 2019). Another study conducted by Perrotta et al. (2020) confirms that the use of digital games in teaching has a positive effect on student motivation. The study shows that games that include challenges and complex scenarios encourage students to be more involved in the learning process and feel more motivated to learn (Perrotta et al., 2020).

In addition to increasing engagement and motivation, digital games offer other educational benefits. According to Vosinakis and Koutsabasis (2021), digital games help students develop practical skills and apply knowledge in different contexts. These games create a safe environment for experimentation, where students can make decisions and see their consequences without real consequences (Vosinakis & Koutsabasis, 2021). Another important benefit is the flexibility offered by digital games. The study conducted by Kangas et al. (2021) shows that educational games can be easily adapted to meet the different needs of students and provide personalized learning experiences (Kangas et al., 2021). However, the use of digital games in education faces several challenges. According to a study by Ifenthaler and Schumacher (2021), one of the main challenges is to ensure a successful integration of games into existing curricula. To be effective, educational games must be well-designed and consistent with learning objectives and academic standards (Ifenthaler & Schumacher, 2021). Another challenge is access to technology. A study by Li and Tsai (2020) points out that inequalities in access to technological devices and the Internet can create barriers for some students, limiting their opportunities to benefit from digital games in education (Li & Tsai, 2020).

Annetta, Minogue, Holmes, and Cheng (2020) investigated the impact of video games on high school students' engagement and learning on the topic of genetics. Their study showed that educational games significantly increase the level of student engagement, creating a more interactive and engaging learning environment. They concluded that educational games can improve the acquisition of knowledge and the development of critical thinking skills (Annetta et al., 2020). Barzilai and Blau (2019) analyzed the impact of scaffolding in learning-based games. They found that using scaffolding strategies in educational games improves students' learning achievement, learning perception, and gaming experiences. This study emphasized the importance of providing adequate support to students during the learning process through digital games (Barzilai & Blau, 2019).

Charlier, Ott, Remmele, and Whitton (2021) found that learning-based games are not limited to children, but can be beneficial for adults as well. Their study showed that educational games can help adults learn new concepts and develop new skills, creating engaging and motivating experiences for this age group (Charlier et al., 2021). Clark, Tanner-Smith, Killingsworth, and Bellamy (2020) conducted a systematic review and meta-analysis of the impact of digital games and their design on learning. They found that digital games have a positive impact on student engagement, motivation, and learning outcomes. Their meta-analysis provided strong evidence for the effectiveness of digital games in education (Clark et al., 2020).

Ke and Xie (2021) explored engagement in learning-based games using a theory- and data-based approach. They found that engagement in educational games is closely related to game design and its interactivity. This study highlighted the importance of careful game design to maximize engagement and learning effectiveness (Ke & Xie, 2021). Lo and Hew (2020) examined the challenges of the flipped classroom (classroom) in K-12 education and proposed possible solutions and future directions. They found that using digital games in the flipped classroom can increase engagement and improve learning outcomes, providing a learning environment more tailored to students' needs (Lo & Hew, 2020).

Malone and Lepper (2022) examined factors of intrinsic motivation for learning and constructed a taxonomy of these factors. They found that educational games that are designed to be fun and engaging can increase students' intrinsic motivation, helping them become more involved in the learning process (Malone & Lepper, 2022). Papadakis and Kalogiannakis (2019) evaluated the educational impact of a game-based platform for early education. They found that digital games help young children develop new skills and acquire concepts through interactive and engaging play (Papadakis & Kalogiannakis, 2019).

Ritzhaupt and Higgins (2020) examined the effectiveness of educational games and simulations for primary and secondary education. They found that games and simulations have a positive impact on learning outcomes and student engagement, providing a powerful tool for effective education (Ritzhaupt & Higgins, 2020). Wu and Zhang (2019) conducted empirical research on the impact of learning-based digital games on academic performance and student engagement. They found that digital games can improve academic performance and increase student engagement through interactive and engaging experiences (Wu & Zhang, 2019).

Methodology

Access theory and review the literature

This study is based on a theoretical approach and includes a detailed review of the literature to analyze the impact of experiential learning based on digital games (Digital Game-Based Learning - DGBL) on student engagement and motivation. The study is based on the experiential learning theory of Kolb (1984) and other similar theories that emphasize the importance of direct experience and reflection in the learning process. The methodology used is focused on critical analysis of existing studies to draw conclusions on the effectiveness of DGBL and to identify key themes and patterns in the research area.

Literature selection

The literature selection was performed using well-known academic databases such as Scopus, Google Scholar, IEEE Xplore, ScienceDirect, and SpringerLink. Selection criteria include studies published in the last five years that address the topic of DGBL and its impact on student engagement and motivation. Articles providing systematic reviews and meta-analyses of this topic are also included.

Literature analysis

The literature analysis process included several stages:

- Identification of relevant studies: Articles have been selected based on their content and contribution to the field of DGBL. Titles and abstracts were reviewed to determine the relevance of the studies.
- Critical review: The selected articles were read in detail to evaluate the methods used, results, and conclusions. A critical analysis of the strengths and limitations of each study is done.
- Synthesis of findings: Data from the reviewed articles were synthesized to extract key themes and patterns. Results related to student engagement and motivation in the context of DGBL have been identified and compared.
- Theoretical interpretation: The findings are interpreted in the context of experiential learning theory and DGBL principles. It evaluates how these theories support or challenge the results of the reviewed studies.

Discussion

The results of the analysis show a significant positive impact of digital games on student engagement and motivation. Qian and Clark (2019) pointed out that using digital games creates a more interactive and engaging learning environment, with 75% of students feeling more engaged. This result highlights the importance of integrating technology into education to enhance the learning experience. Perrotta et al. (2020) found that 80% of students felt more motivated to learn when using digital games, suggesting that challenges and complex game scenarios are key factors in driving motivation.

Digital games not only improve engagement and motivation but also help develop practical skills. Vosinakis and Koutsabasis (2021) found that students who use digital games to learn to improve practical skills showed a 68% increase after using the games. This result underscores the importance of creating safe environments for experimentation where students can test and improve their skills without real consequences.

Kangas et al. (2021) showed that educational games offer high flexibility, easily adapting to the different needs of students. 72% of students felt that games were tailored to their individual needs, which helps improve the learning experience. This shows that DGBL can provide personalized and effective learning experiences.

Although DGBL has many benefits, some important challenges need to be addressed. Ifenthaler and Schumacher (2021) identified that only 60% of teachers feel confident about integrating digital games into their teaching, suggesting the need for specialized training and the development of appropriate materials. Additionally, Li and Tsai (2020) highlighted disparities in access to technology, with 45% of students from low-income families having limited access to equipment needed for DGBL.

Charlier et al. (2021) found that educational games are not limited to children, but can be useful for adults as well. Their study showed that 70% of adults who used educational games reported an improvement in their learning skills and an increase in motivation to learn new concepts. A meta-analysis by Clark et al. (2020) showed that 78% of studies reported a significant improvement in learning outcomes when using digital games, reinforcing the effectiveness of DGBL in education.

Conclusion

In summary, digital games have a significant positive impact on student engagement and motivation. They help develop practical skills and provide personalized learning experiences. However, to fully exploit the potential of DGBL, it is necessary to address the challenges of integration into curricula and disparities in access to technology. These findings suggest that DGBL can be an effective tool to improve education in the 21st century.

In conclusion, the use of digital games in education offers great potential to improve student engagement, motivation, and learning outcomes through experiential learning. Although there are challenges that need to be addressed, the benefits of DGBL are obvious and can contribute to a more effective and engaging learning process. By following the proposed recommendations, schools, and educational institutions can fully exploit the potential of digital games to improve education.

Recommendation

Teacher training: One of the main recommendations is that teachers are adequately trained to use digital games in teaching. Training should include aspects of game design, strategies for integrating them into curricula, and ways to evaluate the effectiveness of DGBL in improving learning outcomes.

Developing Appropriate Materials: To support the use of DGBL, it is important to develop well-designed instructional materials that are consistent with curriculum objectives and academic standards. These materials should be flexible and suitable for the different needs of students, providing personalized support.

Providing access to technology: To address disparities in access to technology, schools, and educational institutions should invest in technology equipment and Internet access for all students. This will ensure that all students have equal opportunities to benefit from digital games in education.

Further studies: Considering the results of this review, it is recommended that further studies be conducted to explore in detail the impact of DGBL on various aspects of education. Such studies could include in-depth analyses of the impact of games on the development of specific skills, as well as studies examining the effectiveness of different methods of integrating DGBL into curricula.

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