



THE MINECRAFTEDU APPLICATION UTILIZATION TO CREATE IMMERSIVE LEARNING IN EDUCATION 4.0

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Abstract

The exponential growth of technology has spurred innovation across a range of fields. This is also evident in the field of educational technology. A variety of studies are conducted to enhance the quality of education and foster meaningful learning. The objective of this research is to examine the potential of Minecraft as a learning tool. The methodology employed is that of a systematic literature review (SLR), which entails a library study flow designed to identify and review journals pertinent to the research topic. This process ultimately yields conclusions. The findings of the research indicate that Minecraft can be incorporated into a variety of subjects. The advantages of integrating Minecraft into learning strategies include enhanced collaboration skills, creativity, digital proficiency, peer tutoring, time management, and an immersive learning environment.

Keywords:

Minecraft, Technology Development, Immersion, Quality Education

INTRODUCTION

In the contemporary era, technology has become an indispensable component of everyday life. The accelerated evolution of numerous domains, particularly within the digital realm, has precipitated profound transformations across a multitude of facets of human existence. One sector that has been significantly affected is education (Alam, 2022). The advent of the concept of Education 4.0 has necessitated that the world of education continues to innovate and adapt technology in the learning process (Bonfield et al., 2020).

The concept of Education 4.0 represents a novel paradigm within the educational system. It entails the integration of advanced technologies, including artificial intelligence (AI), the Internet of Things (IoT), and virtual reality (VR), to create a more effective and relevant learning experience (Tandon et al., 2020). This enables students to learn in a more dynamic, collaborative, and interactive manner.

One of the key concepts highlighted in the Education 4.0 framework is that of immersive learning. Immersive learning is a pedagogical approach that enables students to engage deeply with the subject matter through a comprehensive and multifaceted experience. In this context, technology plays a pivotal role in creating a learning environment that enables students to "feel" and "experience" the subject matter in a tangible manner (Jantakoon et al., 2019).

Nevertheless, despite the considerable potential and advantages that immersive learning offers, there are still several issues that require attention. One of the principal challenges is the accessibility of advanced technology. Not all educational institutions have the requisite access to or funding for the implementation of these technologies on a comprehensive scale.

In response to this challenge, Minecraft Edu has emerged as an innovative solution. Minecraft Edu is a specialized version of the popular video game Minecraft, designed with the specific intention of being used for educational purposes. Minecraft Edu enables educators to create interactive and immersive learning environments, which facilitate the acquisition of knowledge through practical and creative experiences (Fedorenko et al., 2023).

Furthermore, Minecraft Edu employs the concept of gamification in the learning process. A gamification is an approach that employs elements derived from games in a non-game context to

enhance student motivation and engagement (Khalil et al., 2023). The integration of game elements, such as challenges, achievements, and point systems, into Minecraft Edu, provides an engaging and motivating learning experience for students.

This article will further examine the potential benefits of utilizing Minecraft Edu in education, particularly in the context of Education 4.0. Furthermore, the article will examine the potential of gamification to enhance the immersive learning experience for students. It is therefore hoped that this article will provide a more profound understanding of the potential for transforming learning through the application of technology in the field of Education 4.0.

RESEARCH METHOD

The research method employed in this study employs the Literature Review method, which entails a library research flow that focuses on the review and identification of several journals to serve as a reference in following the specified steps (Falah & Hadna, 2022). The source is employed to elucidate the subject matter under investigation. It focuses on "Immersive Learning" by using the MinecraftEdu application in the context of Education 4.0.

Information and data were collected through a variety of sources, including journal articles, conference proceedings, and other published materials. These sources were identified through a comprehensive search strategy and then analyzed to identify relevant information. The data is presented and shared in several sections, namely: 1) Immersive Learning and Gamification 2) The utilization of Minecraft in Education 4.0. 3) Benefits of Minecraft. Subsequently, the researcher can identify and review existing research. Finally, the researcher will present conclusions regarding the journal under study. The articles utilized in this study encompass 26 articles from national journals in Sinta 1 and 2, which are linked to Google Scholar, as well as international journals linked to Science Direct.

RESULT AND DISCUSSION

Review of Theories

A. Gamification Theory

Gamification, which is a specially designed technique associated with games to stimulate and interact directly with learners, allows learners to play while learning. It can also hone their cognitive abilities and social abilities. According to Sari & Nurani (2021) gamification can also improve extrinsic and intrinsic abilities and motivation. Intrinsic motivation is based on encouragement that comes from the learners themselves. Meanwhile, extrinsic motivation is an encouragement that comes from outside the learners. In designing gamification, of course, these learners must be involved in a game. Then, don't forget to add rewards as feedback in learning.

The application of gamification, a relatively novel concept, has the potential to facilitate students' identification of more efficacious approaches to learning. This is undoubtedly one of the most beneficial aspects of gamification, as it encourages students to adopt a more enthusiastic approach to learning. Although he may not fully comprehend the material, his active engagement in the learning process makes it easier for him to grasp the concepts. This is corroborated by Hadi and Attallah's research, which indicates that the incorporation of gamification in learning environments will elicit a favorable response due to the enhanced relaxation and efficiency that it offers.

One of the most significant benefits of effective learning is the enhancement of motivation, engagement, and self-confidence among students. When students are engaged in the learning process, they are more likely to develop a positive attitude towards learning and to achieve high levels of confidence in their abilities. Furthermore, students can resolve problems, and finally, it can enhance their learning experience of what they have learned. Furthermore, the concept of gamification is also being explored in the context of organizational management, as well as in the domains of health, social policy, and education. The term "gamification" is defined as the utilization of mechanisms similar to those employed in gaming, but within an educational setting (Deterding

et al., 2011). As previously stated Koivisto & Hamari (2014), this concept can be defined as the atmosphere that is created when games are designed. It should be noted that the concept of gamification is also packaged by the specific objectives that have been set.

B. Immersive Learning Theory

Immersive is an information technology that is used by blurring the real world with the digital world so that in its use it will feel the atmosphere that exists in the real world. Immersive learning is also an effective learning to be developed because students here can develop their knowledge and skills. Here, immersive learning certainly consists of some artificial content and atmosphere as well as the real world that is enhanced through digital world learning. Thus, as with the gamification concept, learners will be more active in learning (Wahab et al., 2022).

In addition, the various definitions of immersive learning must be aligned with the desired learning outcomes. To achieve this, as stated by Dengel and Magdefrau, immersive learning can be divided into two categories: the use side and the supply side. The use side of immersive learning is concerned with its utility for educational purposes, whereas the supply side is related to the educational media itself. If the focus is on learning and its perception process rather than technological features, immersive learning becomes timeless and is not dependent on existing technological advancements. Consequently, immersive learning facilitates learning by leveraging technological capabilities, engendering a sense of presence akin to being in a specific location or environment, fostering joint presence, and facilitating identity construction by linking visual representations with the self.

C. Minecraft

Minecraft is a digital game from "sandbox" that is quite popular, and more than 100 million game units have been sold to various worlds. This game was created by Minecraft in the form of 3D often known as the block world. This game seeks to invite children to be creative in building an object made in the Minecraft game (Tangkui & Keong, 2020). The Minecraft game itself does not set an object in achieving a goal and gives players the ease and freedom to interact and change the world contained in the Minecraft game. Minecraft itself is a digital game where players are free to remodel and explore without any end or objective that the player wants to achieve and is classified as a lightweight game for children to play (Deng et al., 2020).

The Minecraft game has two modes: creative and survival. In the creative mode, players are encouraged to utilize existing materials or blocks in the game according to their imagination and creativity, to create whatever they desire. In contrast, the survival mode of the game requires players to survive in the Minecraft environment. This entails acquiring the necessary weapons and food, as well as constructing shelters. The objective of the Minecraft game is to facilitate survival in an environment that is subject to the unpredictable actions of numerous opponents, both during the day and at night.

The popularity of Minecraft and the number of tools that can be used in educational contexts that are specifically designed for games make Minecraft an excellent game-based learning tool. Minecraft has also been proven to be used as a teaching tool that can be useful in the world of education and provide 3D visual effects, in addition, Minecraft can be used by many participants at the same time (Zhang et al., 2023).

There is also Minecraft education that can be used in the world of education and has been released by an independent team. where this version is specially made and can be used by educational institutions. This special version of the Minecraft game was designed by teachers from New York elementary schools who were tasked with creating a Minecraft game with a version that makes it easier for teachers who are not familiar with using the game. An important feature in Minecraft is the player's ability to destroy collect and reassemble blocks to form an object that a player wants. With this feature, it is very suitable to combine Minecraft with the world of education.

Learning based on digital games has great potential to increase students' interest and academic knowledge because its use seeks to create a striking and new breakthrough so that in its

use students do not get bored quickly when participating in learning activities. If students are happy while learning their learning motivation will continue to increase. This platform offers transformative game-based learning for educators to engage students in using Minecraft games to increase interest in learning in students. lessons that can be accessed with Minecraft games are quite a lot of small examples, namely in math, history, geometry, project-based learning, and so on.

D. The Use of Minecraft in Education 4.0

The advent of the Industrial Revolution 4.0, which is defined by the rapid and growing era of new technology and artificial intelligence, as well as the increasing use of the internet in various aspects of an individual's life (Ghufron, 2018), has brought about profound changes in the way we live. The advent of the fourth industrial revolution has a profoundly positive impact on human life, particularly in the realm of education. The objective of the Industrial Revolution 4.0 is to equip students with the requisite skills to compete in the global marketplace. These skills, often referred to as the 4C's (collaboration, communication, critical thinking, and problem-solving), are essential for success in the modern world. The utilization of innovation in the pursuit of the 4C objectives in education is exemplified by the integration of media in the learning process.

The utilization of media in learning has been employed before the advent of the 4.0 revolution. However, at that time, the extent of media usage was considerably less than it is currently. The media employed at that time was not as engaging or effective as it is now. In parallel with the evolution of society, the field of learning media has also witnessed a proliferation of diverse types and models that have emerged over time. The use of learning media is considered to be quite helpful, and as a result, educators are now required to use learning media in their teaching. Educators must possess a deeper comprehension of contemporary innovations in education, which may manifest in the form of digital and tangible learning media. These media are designed to enhance the efficiency and efficacy of learning (Khairunnisa & Ilmi, 2020). The utilization of media in the learning process can serve to motivate students to persist in their development and to engage actively in learning activities.

Motivation is a psychological construct that can encourage children to be alert and attentive when engaged in any activity, to achieve a specific expected outcome. Motivation can be influenced by several factors, including psychological, cognitive, and social elements. Furthermore, motivation is associated with an individual's mentality, which can in turn influence their mentality. In the context of academic achievement, motivation is a crucial element that can influence students' academic performance. In the absence of motivation, students tend to exhibit a lack of engagement and interest in learning, as well as a passive approach to the learning process. Consequently, educators must possess the ability to enhance student motivation. The motivation of students can be enhanced straightforwardly. This can be achieved by presenting innovative learning materials that are both engaging and enjoyable. Additionally, the use of various forms of media, including digital and non-digital formats, can help prevent students from becoming easily bored during their learning experiences. One example of digital media that can be employed by educators in the context of learning is the use of Minecraft.

Minecraft has the potential to strengthen students' understanding and mastery of concepts, especially during learning. This is because the Minecraft game frees students' activities to solve a problem they face during learning. The 3D blocks in the Minecraft game can be manipulated again to form concrete objects that will represent polygons. Through polygons, students can visualize learning concepts easily and clearly. The use of Minecraft for learning in the era of education 4.0 is very suitable for use because the main feature of Minecraft itself is the skill of the players in collecting, destroying, and positioning an object that they find when playing Minecraft. Here are some versions of Minecraft that can be used in learning that can be taught to all students, including:

- The software can be employed to construct locations or subjects for study. For instance, it can be utilized to construct ancient inscriptions or civilizations. This can be employed in the context of history and geography lessons.

- Furthermore, the device can be utilized to impart knowledge regarding the fundamental principles inherent to the fields of computing and electronics.
- The software can be utilized to facilitate exploration and the creation of specific components that are particularly well-suited for incorporation into elementary school learning environments.

Indeed, Minecraft can be utilized by language educators to incorporate a plethora of grammatical and lexical elements. The game boasts a plethora of ingenious features that facilitate the incorporation of information in a relatively straightforward manner through the utilization of an array of wooden symbols intrinsic to the game itself (Ramadhaniyasari, 2022). Furthermore, students can also derive benefits from playing this Minecraft game. Consequently, the game also incorporates maps that can be employed in the context of learning. One illustrative example of its development is the human body map feature, which can be utilized in biology classes. Additionally, there are cell models that can be explored within the game. Furthermore, there are models in anatomy and climate simulations, which utilize a range of conditions in the climate and biomes. Minecraft can also be employed to study the phases of the moon and can be utilized in chemistry classes through the use of a specialized mod, called MineCam.

Minecraft has enormous potential to help students learn and increase conceptual knowledge in the Era of education 4.0 Minecraft can help teachers when providing learning to students. In addition, learning based on digital games is very helpful for teachers in collaboration (Tangkui, 2022). By learning using digital games, it will increase the enthusiasm of children to continue learning, especially in this era. Using Minecraft games in learning gives students the ability to express their rights and choices more conceptually with connections across many domains. Understanding Minecraft is a significant component so that students can integrate their knowledge through various subject areas and can have valuable knowledge (Yanuarto et al., 2023). Learning media has a very important role in learning in the 4.0 era, learning media is also a breakthrough that can be used to support 4C skills. Using learning media helps students to improve their learning outcomes. By using Minecraft games in learning in Era 4.0, it provides students with a learning experience that is fun varied, and not monotonous.

Discussion

The Use of MinecraftEdu in a Learning Context

There is another version of Minecraft developed by Mojang Studios. This version is used to support game-based learning (GBL) in virtual learning. It has been downloaded by more than 63 million users within 6 months of its launch in 2016 (Minecraft, 2021). The MinecraftEdu app contains more than 500 curricula and cross-disciplinary lessons, including coding, with content developed in collaboration with NASA and others. Many studies have proven that MinecraftEdu can be implemented in learning.

1) Science Learning

Implementation in science learning is shown by the utilization of blocks that can be flexibly arranged because all they need is 'land' to arrange the blocks into an image desired by the user.



Figure 1 Learning Cells in Minecraft (Pusey & Pusey, 2015)

For example, in biology learning, cells and their parts can be clearly depicted so that students can explore the cells to identify their parts and functions (Pusey & Pusey, 2015).

2) Math Learning

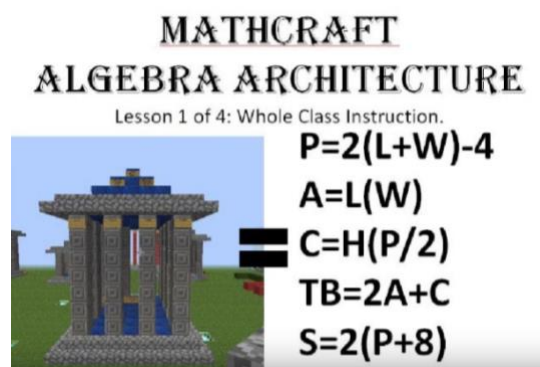


Figure 2 Algebra Learning in Minecraft (Ellison, 2016)

In the context of mathematics learning, teachers can implement modifications according to the specific learning topic being addressed. The implementation of this approach will assist teachers in learning abstract mathematical concepts through an inquiry-based learning model. In the context of Minecraft, students do not engage in the game itself, but rather utilize it as a tool for practicing mathematics and identifying mathematical problems. This allows students to participate in mathematical activities (Ellison et al., 2016; Yanuarto et al., 2023).

3) Language Learning

The form of learning that can be done is learning to write using blocks. Teachers develop modules that contain instructions for learning activities using gamification techniques. Students who learned with the help of Minecraft claimed to be more motivated in learning languages and increased confidence and satisfaction in learning (Hussein & Mustafa, 2021). A free learning environment has an impact on students' comfort in learning.

4) Geography Learning

The real-world nature of Minecraft allows users to explore the environment. For example, in geography, students can learn about the structure of rocks and soil by exploring each layer. Another lesson is to utilize the flexibility of land and elements in Minecraft to reconstruct real-world buildings using scale comparisons to produce three-dimensional products that match the original form.

The Benefits of Using Minecraft in Education

The advent of new technologies has prompted a resurgence of innovation in the field of education, to enhance the quality of learning and foster meaningful engagement. The development of learning strategies and techniques remains a topic of ongoing investigation. In parallel, technological advances are creating virtual environments that attract children to engage in play. To combine meaningful learning with a fun environment, educators can integrate online games into

the learning process, thereby introducing a variety of learning strategies. The incorporation of games into the learning process aligns with the tenets of gamification theory, which posits that students can simultaneously engage in both learning and play. The implementation of Minecraft gamification has been conducted across disciplines. Research has demonstrated the advantages of utilizing Minecraft in educational settings (Slattery et al., 2023; Smolčec, 2014):

- (1) Collaboration - Minecraft can support collaborative learning by engaging in communication, learning to work in teams, building a positive collaboration environment, and brainstorming to solve problems.
- (2) Creativity - The virtual space in Minecraft allows students to express their ideas and imaginative works. In addition, students have the opportunity to experience the real world transformed into the virtual world such as visiting historical buildings, for example, the Eiffel Tower, and others.
- (3) Digital skills - Improve computer skills such as fast typing, finding special characters faster, typing codes, and typing IP addresses.
- (4) Peer tutor - Each student cooperates and provides help to each other in solving problems in a particular subject.
- (5) Time difference - Students recognize the time difference especially when they play with other users who are from different regions from other parts of the world.
- (6) Immersive learning environment - A more realistic learning experience and enhanced student learning experience.

This capability is achieved through the integration of the learning model with the video game Minecraft. Users, including both teachers and students, are allowed to modify almost every object. This results in flexibility that can be adapted to any learning project and increases the player's creative freedom. The elements of the game adapt to a simple ecological system comprising a variety of plant and animal forms. Players can participate in modifying the environment to ascertain the impact of the treatment (Ramadhaniasari, 2022). In contrast, the utilization of Minecraft extends beyond the domain of media and fosters the development of 21st-century skills. The learning process that is student-centered and stimulates students helps students in cognitive processes and skills such as critical and creative thinking based on the projects they make in Minecraft (Hebert & Jenson, 2020).

The practice of learning with Minecraft still requires other teaching materials or media such as textbooks to support learning. This is a reminder that using Minecraft is just one way to increase interest in being active and engaged in the learning process. Minecraft provides a digital space for creativity, stimulating social skills and computer skills. Teachers in their role as facilitators need to provide guidance and instruction that helps students maximize the integration of immersive technology in education. In addition, teachers can instill an understanding that games are not only used for entertainment but there is value in the benefits gained so that the learning process can be done in various ways.

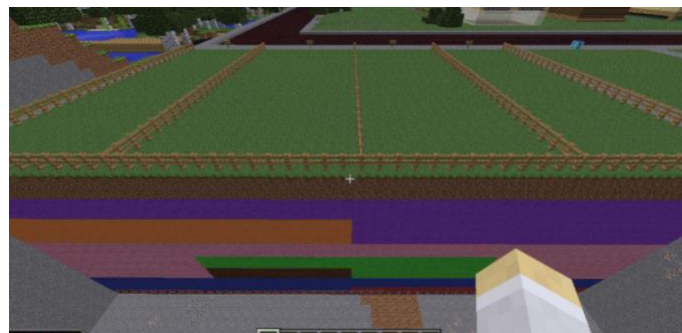


Figure 3 Geography Learning in Minecraft (Pusey & Pusey, 2015)

CONCLUSION

Immersive learning is a pedagogical approach that enables students to fully engage with the subject matter through a comprehensive and immersive experience. Empirical evidence indicates that the incorporation of Minecraft into the educational process can enhance the quality of learning outcomes. Furthermore, the incorporation of gamification can enhance the immersive learning experience for students. To meet the demands of Education 4.0, educational institutions must be willing to innovate and adapt their use of technology in the learning process. Minecraft Edu is a version of the video game Minecraft that has been adapted for use in an educational setting. Gamification is an approach that employs game elements in a non-game context to enhance student motivation and engagement. The integration of Minecraft Edu and gamification in educational settings has the potential to enhance student's abilities and foster a creative and interactive learning environment.

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