Universiti Teknologi MARA

ScienceGenius: An Augmented Reality Learning Tool for Primary School Science Subject

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ABSTRACT

This study explores the potential of Augmented Reality (AR) as an innovative tool for enhancing primary school science education, particularly in simplifying complex scientific concepts. The research aims to design and develop an interactive AR-based learning model that breaks down these intricate concepts, making them more accessible and engaging for young students. Traditional methods of teaching science often rely heavily on two-dimensional illustrations and passive learning techniques, which limit students' ability to fully grasp and connect with abstract topics such as the human body, microorganisms, and the solar system. AR, with its unique capability to overlay digital information onto the physical world, provides an immersive and interactive experience, enabling students to visualize, manipulate, and interact with scientific phenomena in three dimensions, thereby fostering a deeper understanding. The research draws on established learning theories to design and evaluate an interactive AR learning model. To guide the development process, the Scrum methodology, known for its iterative and collaborative approach, is employed to ensure continuous refinement and improvement of the AR model. Furthermore, the research investigates practical considerations for integrating AR into classroom settings, addressing potential challenges such as device affordability, accessibility, and compatibility with existing educational infrastructure, as well as technological constraints. The outcomes of this study are expected to provide valuable insights into the effectiveness of AR-based learning tools, laying a strong foundation for future advancements in educational practices. Ultimately, this research aims to promote STEM literacy, inspire curiosity, and transform science education for primary school students.

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INTRODUCTION

The integration of technology into education has paved the way for innovative teaching methods, with Augmented Reality (AR) emerging as a transformative tool. AR blends the virtual and physical worlds by overlaying digital information onto real environments, making abstract and complex concepts more tangible and engaging. This technology holds significant promise in science education, where traditional methods often struggle to effectively convey intricate topics such as molecular structures, physical phenomena, and biological processes. By leveraging interactive 3D simulations and visualizations, AR can revolutionize learning by providing immersive, hands-on experiences that enhance understanding and retention.

Despite the potential of AR, science education faces persistent challenges. Many students find it difficult to grasp abstract concepts due to the limitations of conventional teaching tools, such as textbooks and static visuals. Moreover, financial constraints often hinder schools from providing advanced equipment or experiments needed for interactive learning. These barriers contribute to a lack of engagement and reduced interest in STEM fields, leaving a gap in science literacy that could impede critical thinking and problem-solving skills essential for future careers.

This research seeks to address these challenges by exploring the application of AR in primary school science education. Focused on foundational topics like the human body, microorganisms, and the solar system, this study aims to design an interactive AR-based learning model that simplifies complex concepts and fosters deeper understanding. By evaluating the model's effectiveness in enhancing engagement and comprehension, the project aspires to demonstrate AR’s potential as a transformative tool in education. Additionally, the study will offer insights for educators and developers, contributing to the advancement of innovative, accessible teaching methods that inspire a lifelong interest in science.