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Augmented Reality Technology Interactive Learning

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Abstract

The use of Augmented Reality (AR) in educational settings has gained significant attention due to its potential to enhance learning experiences. AR integrates digital information with the physical world, providing an interactive learning environment. In the context of laboratory experiments, AR can be particularly beneficial. Augmented reality is an interactive experience that enhances the real world with computer-generated perception. AR connects the "real world" and the virtual world. Basically, AR takes the real world and enhances it with computational elements. However, there are many applications where augmented reality can enhance the learning experience of e-learning students. The ability of augmented reality to increase students' attention to course material while at home cannot be underestimated. A new technology called augmented reality (AR), which combines the real world and the world created by an interactive computer system in the form of a single environment, tries to avoid problems as mentioned above by providing students with an AR laboratory which is a combination of real labs augmented by virtual objects.

Keywords: Augmented reality, blended education, learning

Introduction

The use of Augmented Reality (AR) in educational settings has gained significant attention due to its potential to enhance learning experiences. AR integrates digital information with the physical world, providing an interactive learning environment. In the context of laboratory experiments, AR can be particularly beneficial. Traditional laboratory settings often present challenges such as limited access to equipment, safety concerns, and the abstract nature of theoretical concepts which can be difficult for students to grasp. Augmented Reality can address these issues by creating a virtual environment where students can visualize and interact with complex concepts and equipment without the constraints of the physical lab. This technology allows for the visualization of intricate processes and the interaction with virtual simulations of real-world equipment, thereby improving understanding and retention of knowledge. Studies have shown that the use of AR in educational contexts can lead to better learning outcomes, increased motivation, and enhanced engagement among students.

One of the main benefits of augmented reality in education is that students can examine students from different angles than their own. By moving virtual objects or changing locations, you can explore and better understand specific topics. Most importantly, students can learn experientially from home. This type of learning is more likely to be remembered and understood by students than other methods. Augmented reality in educational centers will replace paper textbooks. With the help of this app, students don't need to bring study materials to class because they have everything on their smartphone. AR systems combine computer-generated and virtual content and place it directly on real objects.

AR in education :

Those days are over when things were presented in lectures using powerpoint . Today's teachers and students are looking for interactive solutions. The old teaching model needs to be changed because students in traditional classes get bored and sometimes don't understand what is being said.This technology also expands visual content for visually impaired students, making it a completely different learning experience at home. With the help of AR students will be engaged in learning more actively. One of the most important advantages of augmented reality in education is the opportunity for the student to look at the model itself from many different perspectives. By moving around a virtual question or turning it in space, they can superiorly look at and get certain concepts. Most vitally, it permits understudies the good thing about at-home experiential learning. Students are more likely to remember and understand this learning than other methods.

Augmented reality in schools is replacing paper textbooks. With this, students don't have to

carry study materials to class because they have everything they need on their smartphone. In addition, schools can reduce the cost of teaching materials and supplies such as blackboards, posters, etc. Students communicate with the teacher and access learning resources directly in the app. AR is a new technology that combines real-world assets with real-world assets. Virtual objects enhance our perception and interaction with the world around us. AR is used in entertainment, education, healthcare and technology. Using augmented reality (AR) models students can perform these tests in a virtual lab environment that allows us to use digital tools and simulation of equipment. In recent years, some surgical procedures are performed using augmented reality technology [2].

Augmented reality textbooks can be a solution for blended education of the future[1]. Augmented reality can play an important role in enhancing student learning in engineering education. AR can be applied in the field of education. The AR-based Laboratory Manual is designed as a 3D visualization of laboratory experiments and allows students to interact with the learning environment. Users simply scan the code placed on the book. The software/application captures the image and combines it into virtual graphics. The use of augmented reality textbooks in electrical engineering can improve academic performance by improving student understanding and performance.[4].

Approach:

The diagram a process for integrating accessible augmented reality (AR) in education. It begins with "Designing Accessible AR," which focuses on creating AR tools that are usable by all students

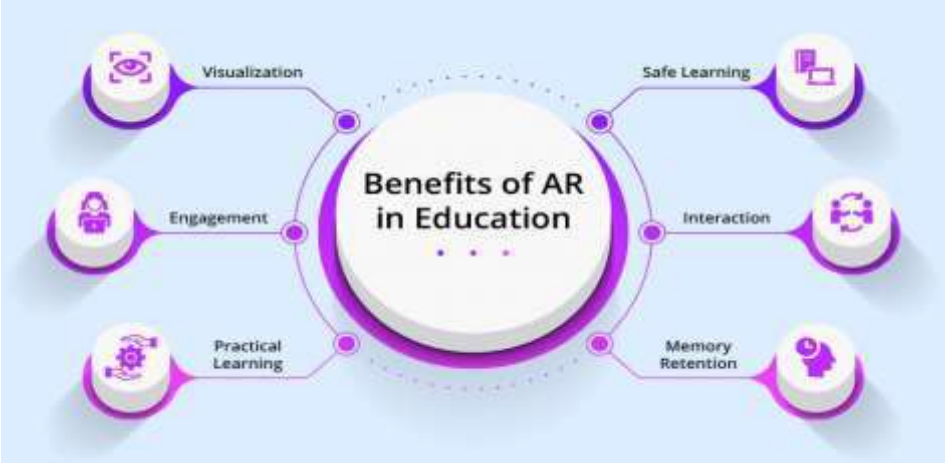

Figure 1: AR Implementation in Education

Next is "Educator Training," ensuring teachers are well-prepared to use these tools effectively. "Content Representation" involves developing educational content that leverages AR to enhance learning. "Monitoring and Feedback" includes ongoing assessment and adjustments based on feedback to improve the AR experiences. Finally, "Open Discussion" provides a platform for continuous dialogue among educators, students, and developers to refine and advance the use of accessible AR in education.

1.**Smart Book**: Lots of pictures to help elementary students learn. The pictures will help you visualize the information after reading and help the students to understand the topic more deeply. Color images can add value to the content to get better understanding. However, it is not possible to print many color photos in the book. But smart books can be prepared with 3D images with the help of blender to engage the students in learning so that they can quickly grab the contents.

2.**AR in Laboratory:**

Here, learning is hands-on and classes are designed to give students the opportunity to experience and gain practical skills. To be effective in your lab classes, you need a good instructor/facilitator to supervise each group of students, guide them to learn from their mistakes every step of the way, and get them to know their skills to the best of their abilities. But the instructor cannot give full attention to all groups at a time. Here AR in the laboratory

will help the students to perform lab experiments virtually with the help of instruction provided in the AR lab with safety measures. Active learning can be enhanced through AR with quizzes and tests.

Another advantage of AR is that it can give flexibility for experiments with tools. In a traditional laboratory, there is a limit on experiments performed due to the physical availability of equipment. On the other hand, with the help of AR multiple experiments can be performed at time with the help of a virtual environment. With the help of AR students can visualize abstract concepts.

AR Advantages:

AR overcomes the limitations of physical space and equipment availability.

- Enhanced Safety: AR provides a safe environment for students to take tests without risking accidents or coming into contact with hazardous substances. Virtual items can simulate dangerous situations.
- Interaction and engagement: AR immerses students in dynamic and interactive learning environments. Manipulate virtual objects, visualize complex concepts, and observe overlays of real-world data to enhance understanding of concepts.
- There are many beneficial outcomes of using AR in educational settings, such as higher levels of academic performance, motivation to learn, enjoyment, interest in the subject, content engagement, and content retention[3].

Conclusion

Use Android mobile tools to build apps that take advantage of various mobile features. Open source AR SDK tools help you create exciting AR visuals that combine the digital and physical worlds.The field of augmented reality uses the virtual world and places it in the real world in which we live. Applications include the medical field, education, marketing and many others.By integrating augmented reality into laboratory learning environments, engineering students can overcome the limitations of traditional laboratories, access more comprehensive resources, and enhance their practical skills and understanding of engineering concepts. Thus AR can be used for future blended education.

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