



International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Augmented Reality (AR) and Virtual Reality (VR)

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ABSTRACT:

Virtual reality (VR) and augmented reality (AR) are the newest technologies that provide education a fresh perspective. The application of AR and VR in education, particularly in the process of teaching and learning, is reviewed in this paper. This research was done at a library. According to the research, instructors and students may use AR and VR as effective teaching and learning tools. AR adds text, music effects, or visual components to the actual world to enhance it. However, virtual reality produces a fresh simulation setting that displays. Conversely, virtual reality (VR) develops a whole new simulation environment that teaches pupils a particular subject in a way that is interesting, participatory, and interactive. Many subjects are taught using augmented reality, such as biology (the study of living things' anatomy), chemistry (the study of atoms), geography (the study of the earth and space), informatics (the study of computer network topology), mathematics (the study of geometry), and history (the study of three-dimensional storytelling). Many subjects, including biology (the digestive system), mathematics (geometry), geography (the surface of the planet), history (relics and temples), astronomy (space), medicine (surgical operation practicum), and aviation education (pilot training), are taught using virtual reality technology.

Nonetheless, there are benefits and drawbacks to both AR and VR. There are many obstacles to overcome when incorporating AR and VR technology into educational settings, but there are also some considerations. In the future, it is anticipated that AR and VR will revolutionize education and help to enhance academic standards.

Keywords: teaching & learning, augmented reality (AR), virtual reality (VR) and education

1. INTRODUCTION:

Technological growth invariably brings about major changes throughout history. In the industrial era, a growing number of people from various backgrounds are adopting technology. The accompanying components change as the times do. Nearly every aspect of education is impacted by technology. Because to the ongoing advancements in technology, there are now more possibilities in education. Thanks to technological advancements, both instructors and students may now further their knowledge outside of the classroom. They can easily reach the entire world if they have access to the right resources and equipment. Access to augmented reality (AR) and virtual reality (VR) technologies allows students to engage with content in a way that is more authentic and significant, since they provide a plethora of chances for collaboration. AR has the potential to produce educational resources that are not now achievable, such as three-dimensional object viewing. Only with the aid of a laptop or cell phone can we see something without really having to do it. Even utilizing virtual reality (VR) itself, students can participate in activities that are prohibited during the epidemic. For example, we may learn about forbidden sports by using virtual reality (VR), which connects all our movement instruments with a virtual world. The teacher creates digital motion models that we can then copy. Additionally, the teacher can assess our movements.

With the use of virtual reality technology, items may be shown as though they were in the actual world. Technology is advancing so quickly these days that nothing surprises us in this century. Different technology improvements have been made in several sectors, both by both people and businesses. Technology as it exists now nearly ubiquitous in every facet of human existence, is in fact rather wonderful and simple. For example, Humans can now interact and obtain information more rapidly because to advancements in communication technology. Large data sets can now be accommodated by these technologies. proportions. It is impossible to separate the area of education from these technical advancements.

Augmented Reality (AR) and Virtual Reality (VR). Users can engage with a computer-simulated world thanks to virtual reality technology. Users of VR can enter a state that is visualized as though it were real or taking place in front of them. AR, on the other hand, is a technology that allows you to integrate virtual or two-dimensional items into the actual environment. With the use of augmented reality technology, users may display virtual items onto actual space.

2. OVERVIEW OF LITERATURE:

A. Virtual Reality (VR): VR is a concept that uses computer-human interaction to simulate a future reality. Humans can travel virtually and explore the world. Virtual reality (VR) is a man-made program that simulates real-world environments using various devices. Virtual reality (VR) technology enables people to enter and explore a virtual environment as if it were the real world, through direct and immersive interaction. Virtual reality is a technology-based computer that integrates specialized input and output devices. With the use of computer-based virtual reality (VR) learning resources, students may study without being limited by time or place at any point in time.

In virtual reality, one may simulate or reproduce a human sensory experience. Most virtual reality systems generate a virtual environment using vision. Virtual reality applications allow users to tailor their perception of reality by integrating other senses such as sight and sound. The capacity to combine virtual and real-world interactions and experiences to create a comparable experience is one of virtual reality's features. Virtual reality is the term for a man-made setting that simulates the real world. Most popular VR systems require a VR headset or multi-projection environment to give realistic sights, sounds, and other sensations that simulate the user's physical presence in a virtual world. It is clear from this that employing virtual reality equipment would result in high immersion, a sort of immersive experience in which the person experiences a virtual environment as if it were their own and feels completely immersed in it.

B. Augmented Reality (AR): Augmented Reality (AR) is the idea that virtual data may be integrated into the real world to create a virtual experience. AR integrates virtual information into the real environment and simplifies the presentation of streaming media and games. The phrase "augmented reality" (AR) is a technology that lets users interact with three-dimensional, computer-generated virtual objects on their mobile devices' screens. Augmented reality is a way of viewing the real world that includes "adding" computer-generated stuff to it highlights the fact that augmented reality is a technology that incorporates 2D or 3D computer-generated objects into the real environment in real time.

Augmented reality (AR) technology combines virtual and physical components to produce three-dimensional (3D) objects that are visible on a screen.

Augmented reality has several uses in a wide range of sectors, including education. The technology incorporates instructional content to enhance the engagement factor of augmented reality. A smartphone or other device that satisfies a reasonable set of requirements is required for AR-enabled instructional materials. Three-dimensional animation, images, and a camera integrated into the AR application are the components that comprise augmented reality. AR learning materials may also illustrate abstract concepts to help learners understand and organize an object model. As a result, AR becomes a more useful tool for accomplishing the objectives of learning media.

3. Applications of Augmented Reality:

The following are some disciplines that use augmented reality (AR) technology in the classroom:

- **3D Storytelling in History:** Innovating is also necessary while teaching history to pupils. At this point, AR technology is not limited to creating precise category guidance. The social sector must adopt a more sophisticated role in igniting children's interest in learning.

particularly when media outlets are using 3D glasses to tell historical stories. Since they have invested in it, they will treat it with due seriousness. The research cited above suggest that augmented reality technology has a significant role in education. A student's motivation and desire to learn more deeply are greatly influenced. Do not be hesitant to use this strategy if we have not before; the outcomes are really good. not just for our pupils but also for ourselves. Examples of how AR is being used in

The forms of learning already mentioned include are a handful of the numerous examples. All others, it is constantly used in a lot of other topics as well.

- **Topology of Computer Networks in Informatics:** Teachers in the computer network department should try incorporating as much augmented reality as they can into their teachings. The justification for this is that a significant number of trade schools utilize it to teach pupils computer network topology. Several applications have also been made available to support the learning process in this discipline. Individuals can do independent analysis and study on the relatively complex intricacies of computer network structure. During the learning process, students will become more adept at comprehending the material without needing to hear it again.
- **Mathematics with a Geometry:** Who would have imagined that learning how to construct space might also be more enjoyable? Indeed, because there are AR-based Geometric issues can be caused by technology easily resolved. If our teaching institution if it has not been put into practice, then right away Use it to improve the caliber of instruction as well as education. Students that are fearful of Mathematicians have no more excuses not to learn. This medium is a beneficial substitute. Students comprehend without needing to be coerced they.
- **Space and the Earth in Geography:** This technique is required for earth and space-related materials. It has been used by several educational institutions to supplement geography courses, which frequently involve terminology that are challenging to grasp. Instructors are incentivized to join their pupils in their exploration of the planet and its furthest reaches. Atlases and globes are no longer the only educational resources available. These props are more archaic and often dull than they are useful in modern times. In fact, the existence of AR has given the field of education fresh promise for further rapid and effective development.

- Biology's Anatomy of Living Things: AR-based media will be highly beneficial for both professors and students in biology classes. Particularly while researching the anatomy of diverse animals. If one is merely using a microscope to observe a single cell, the experience will be extremely different. In AR, three-dimensional representation shows the form of cells from different angles.

Every inch of the visible cell side may be studied by students. Students may only focus on the form of the object when using a microscope. On the other hand, everything he sees in AR-based teaching materials is theoretically supported, and a wealth of extra information that is not found in conventional teaching materials is provided.

4. Applications of Virtual Reality (VR):

Here are some examples of disciplines where virtual reality (VR) is being used in the educational process.

- Medical Education Surgical Operation Practicum: The educational institutions that train aspiring physicians to conduct surgical procedures also profit from this technology. VR is a more cost-effective method of teaching doctors than using a doll or a real body as it allows for a thorough analysis of the exercise's outcomes.
- Historical Artifacts and Temples: This technique may also be used to study the past. The only ways to observe historical artifacts or temples are through drab photos or movies. By using virtual reality (VR) in the classroom, students may observe historical social and environmental situations as well as artifacts from the past. Students are encouraged to engage and consider prior lives critically as a result.
- Instruction for pilots in aviation education: Even experienced pilots may practice flying a plane without operating one. It also works well and lowers the possibility of mishaps. Due to virtual reality's ability to replicate real-world scenarios, trainees may practice shooting without wasting actual ammunition, particularly when undergoing fighter pilot training.
- In Astronomy, Space: In order to study the universe directly, schools usually visit the planetarium and observatory. A replica of the night sky and props depicting planets and other celestial bodies are present. However, it is less successful, especially during a pandemic. Virtual reality technology may be used in the classroom and at home to teach children about the universe. Compared to pictures seen in books or movies, learning about planets and other space objects is simpler when 3D concepts are displayed.

5. Obstacles to AR and VR Education Media Implementation in Academic Institutions:

Because of their indisputable advantages, augmented reality (AR) and virtual reality (VR) technologies are currently becoming more and more common and extensively used in education. The use of AR and VR technology in education has led to a dramatic rise in students' interest in and comprehension of course topics. There is no need to go into detail while describing a subject when using Mixed Reality (MR) glasses. It has the power to completely transform and reinvent the way we educate and learn.

Nevertheless, there are still issues with AR and VR education that make its application difficult. These five issues are as follows:

- Launch and Distribution: Investment and distribution are intimately intertwined. To build "interactive stuff," like Chromebooks, one must generate money even in the absence of mass distribution. Because of its affordable pricing and ability to reach a wider audience, schools are already using Chromebooks. However, it proceeds at varying speeds depending on the location. With Chromebooks, AR and VR will probably follow similar paths.
- Technological Transition: There will be a transitional phase to become used to new formats and platforms, as with every major technological shift. When educators are unable to adhere to the transition time, this may be a challenge. It is fascinating to use immersive and interactive technology in the classroom. Instead of simply reading about other people's experiences, students should actively create their projects by carrying them out, doing them again, and learning from them. The challenges present a challenge for developers to tackle right now, as AR and VR technologies hold great promise for enhancing the educational experience for kids.
- Issues with Funding Availability: Lack of funding is a significant barrier to the public education system. This is a significant barrier as it requires spending hundreds of millions of rupiahs on new electronic equipment for the classroom in addition to the price of putting up the required safety measures and training. However, based on the advantages that can raise educational standards, it can be inferred that human standards in this nation would rise as well. Additionally, the investment is quite doable if the government supports and takes part in the implementation of this educational technology.
- Superior Content: Content is important because users of these AR and VR learning systems will be consuming it. If users of technology are unable to locate any useful material, then what good is it? In this case, content that is beneficial, of high quality, and can elevate the bar of instruction by employing instructional materials that are easier for teachers to impart and for students to understand is one of the main reasons why schools and other educational institutions should purchase this educational technology.

CONCLUSION:

There is no reason to distrust the more advanced technologies of today. Examples of technology that offers consumers in the realm of education a novel experience include augmented reality (AR) and virtual reality (VR). Nonetheless, there are advantages and disadvantages to both technologies. To fully grasp augmented reality's (AR) and virtual reality's (VR) effects on education, it is critical to make this distinction. Text, sound effects, and/or image components are added to the real world to create augmented reality (AR). In contrast, virtual reality (VR) develops a novel simulation environment that gives pupils a particular subject in an interesting, hands-on, and interactive manner. One tool that instructors and students may use as a learning medium is this technology. The following are some disciplines that use augmented reality (AR) technology in the classroom: 1) Biology: anatomy of living things; 2) Chemistry: atoms; 3) Geography: earth and space; 4) Film and television: movie screening; 5) Informatics: computer network architecture; 6) Mathematics: geometry; and 7) History: 3D stories. Virtual Reality (VR) technology is used in the teaching and learning process in several subjects, including: 1) biology's digestive system; 2) mathematics' geometry; 3) geography's earth's surface; 4) history's artifacts and temples; 5) astronomy's space; 6) medical education's surgical operation practicum; and 7) aviation education's pilot training.

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