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Augmented Reality in Education

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ABSTRACT

Augmented Reality (AR), is the combination of real world and computerized content. It contains information in digital format that incorporates live and virtual world with real-time interaction. Various Institutes and colleges are using Augmented Reality. Applying the technology in the education sector can result in having a smart campus. Along with it, this paper will discuss the Application of Augmented Reality in different Teaching and Learning sectors and how they differ from the conventional methods.

Keywords:- Augmented Reality, Computerized, Digital, Virtual, Real-time.

Introduction:

Around the world, a wide range of technologies and methods are employed in the field of educational technology to better support the teaching and learning processes. The technology of augmented reality (AR), which is one of these methods, is gaining popularity on a global scale. Users using AR can view the real world with digital data overlay. The use of AR is widespread, including applications in the military, medical field, engineering, travel, and advertising. AR has been able to expand quickly because it doesn't call for the usage of specialized equipment. When it was first introduced, it was a technology that could only be used with specific gadgets, such head-mounted displays, but today it can be used with any computer or mobile device. Research on augmented reality (AR) as a learning and teaching aid has been ongoing in the educational setting. Because it offers distinctive learning experiences that cannot be achieved using other technologies or methodologies, AR has sparked a lot of interest in the research community. With AR, content may be interacted with in novel ways, scientific phenomena can be better visualized, and the cognitive load is lessened.

The first system was utilized for both Virtual Reality and Augmented Reality back in the 1960s, marking the beginning of AR. It utilized a head-mounted optical see-through display that was tracked using either an ultrasonic tracker or a mechanical tracker. At the time, only extremely basic wireframe diagrams could be rendered in real time due to the computing power limitations. Since then, a number of large corporations have used augmented reality for training, visualization, and other uses. Former Boeing researcher Tom Caudell is credited with coining the phrase "Augmented Reality," which is thought to have happened around 1990.

Another integration that augmented reality is typically defined for is its ability to provide users with extra information. These extra details are optional and might not have any bearing on the system's actual user. An augmented reality system employs the following techniques to deliver this extra information: tracking the user's point of view, capturing the camera's field of view, and obtaining additional information for at least one object in the field of perspective acquired. If the user is interested in a vehicle, the system should display an augmented reality replica of a vehicle and cover the user's environment based on the point of interest. This is a perfect example of supplemental information that obtains additional data in the field of perspective captured for at least one object.

Augmented Reality For Education:

Apps for augmented reality (AR) have gained more popularity during the past 20 years. AR was first applied to apps for pilot education and Air Force training in the 1990s. According to the 2011 Horizon Report, AR creates new world experiences with its

data layering over 3D space, recommending that AR should be adopted within the next 2-3 years to present new opportunities for teaching, learning, research, or creative investigation. To create a mixed reality where virtual things and real environments interact meaningfully to improve learning experiences, augmented reality (AR) uses virtual objects or data that overlap physical objects or environments. The aforementioned virtual things reside in the same physical space as their real-world counterparts. The usage of augmented reality (AR) in educational settings has become widespread.

A significant area of study in recent years has also been AR. The fact that head mounted screens and other expensive, sophisticated equipment are no longer necessary is one of the most important elements influencing the widespread adoption of AR technology. The K–12 level in school now uses augmented reality extensively. Several universities are now utilizing augmented reality. A smart campus could result from the use of technology in the education sector. Professors and students will benefit from smart campuses, which will manage the resources available and enhance the user experience with pro-active services.

Typically, a smart campus is created for smart cities. A smart city is one that uses technological design in its urban planning to address issues that its residents experience. Every building in a smart city is technologically modelled, from information systems to transportation technology, libraries, hospitals, and schools, to other community functions. The pupils' awareness of the environmental context is linked to these community services. Through the deliberately merging electronic items with a live environment setting, augmented reality (AR) delivers prospective benefits for boosting comprehension of environmental context awareness and the cultural framework and increasing the experiences of learners in live environment settings.

A. Augmented Reality for English Education:

The International Student Assessment Programme (PISA), which revealed that just 8% of students in OECD countries are top readers, has recently brought attention to reading comprehension. The use of digital tools like augmented reality technology in the classroom is a priceless tool for creating results that are compelling and for reaching standards by integrating students in learning activities like reading. For students engaged in language instruction, clear written and spoken input is crucial since the use of animations, sounds, videos, and pictures enhances their initial learning as well as their long-term and fascinating learning.

In this sense, there are several opportunities for language teaching and learning provided by AR technology. Language learners' actions have been examined scientifically using the Augmented Reality game ChronoOps. The ChronoOps project's main objective is to conduct a scientific research of language learners that use an AR location-based portable match that adds situational learning and encourages participants to expand beyond the typical subject roles associated with "student" or "learner" roles.

B. Augmented Reality for Foreign Language Education:

Initially, Arabic language instruction cannot solely rely on the conventional teaching methods that Arabic lecturers still favour, such as taking notes and lecturing. Early research and observations by scientists indicate that the lack of use of instructional digital developments for learning and teaching Arabic has hampered the memorizing process of teaching Arabic language in the classroom. A new need like this calls for an intervention employing educational resources for teaching Arabic, including Arabic courseware.

With thorough knowledge and understanding of the learner's intrinsic and extrinsic incentives, educators and professional trainers should manage its execution, resulting in the creation of a positive personalized environment. Greater truth offers untapped educational potential and the ability to seamlessly assist students in a natural setting. When used as an e-learning tool, augmented reality improves content understanding, linguistic linkages, spatial constructions learning, long-term memory retention, cooperation, and motivation. A learning tool named Explorez has been created for the French language. Through Explorez, learning can take place outside of the traditional classroom setting with the goal of providing students with a relevant and useful

educational experience that is immersive and contextual.

C. Augmented Reality for ICT Education:

Computer approaches were used in educational settings to increase the flexibility and intuitiveness of learning. Among these methods, augmented reality (AR) has gained significant government interest because it presents a novel teaching perspective by enabling students to visualize intricate spatial linkages and abstract concepts. The lack of teaching experience and effective teaching applications, for example, is one reason why many Malaysian non-technical learners are unmotivated to take ICT courses, according to research. In light of this problem, the study teams carried out a quasi-experimental analysis to look at the negative impact of a new mobile augmented reality learning application (MARLA) on students' motivation to learn a subject in a university ICT course.

The results revealed that male learners were more motivated than their opposite counterparts. Additionally, there was a gender-method interaction effect, with different degrees of motivation among male learners depending on the style of instruction. The success of using such a mobile learning tool to help non-technical undergraduates study more effectively would depend on sufficient planning and execution while taking the participants' demographic backgrounds into account.

Another study in the ICT education field aims to determine whether using AR techniques would make it easier to apply them for changing learning styles and to examine a unique outcome in blended learning that combines online and AR. It was discovered that when integrating augmented reality (AR) apps into a course, technology instructional scientists should carefully consider the educational goal architecture, the data size shown on the cellphone monitor, the teaching machinery, and the setting of the school facilities.

D. Augmented Reality for Science Education:

Education professionals must deal with a number of issues that are inherent in the teaching of science disciplines like physics, including expensive or inadequate laboratory equipment, equipment errors, and difficulties recreating certain experimental conditions. The use of augmented reality (AR) can be a productive strategy for solving these issues. Regarding the aforementioned issues, a study on magnetic field education has been done. The analysis's findings showed that the learners' learning attitude and outcomes might be improved by using AR-based movement-sensing software. This study makes a case for integrating augmented reality technology into physics secondary education.

Using augmented reality as a learning tool is also incredibly beneficial for studying about health science, medical anatomy, and neurosurgery. Anatomical learning is best carried out utilizing a tool that will present these angles in an environment where necessary structure needs to be studied from all aspects. Because the developer can easily control how the augmented object will spin and appear, augmented reality is one of the best tools for displaying angles. When compared to conventional pedagogical models, VR and AR can create better learning environments. Learning in 3D settings can promote context-based learning, spatial information representation, learner motivation and engagement, and technical skill development. From trephination to image-guided navigation, neurosurgical techniques have undergone a technological revolution during the past several centuries. Recent developments in virtual reality (VR) and augmented reality (AR) are some of the newest methods for integrating into resident education and neurosurgery exercise.

Studies have demonstrated that augmented reality technology can dramatically enhance educational outcomes. For instance, AR enables students to take part in authentic real-world adventures like marine life investigations, which not everyone has been able to do. Rich and complex problems are a part of marine education. It is necessary to provide new educational resources to increase understanding of maritime environments and issues.

E. Augmented Reality for Social Science and History Education:

An expedition leader is comparable to one of the many jobs a teacher plays, claims Field Day Lab (2016). Teachers are taking their students on a discovery tour that broadens their understanding of

the world and equips them to be more informed, inquisitive, and possibly even more empathic global citizens. Researchers from a wide range of disciplines, including anthropology, cognitive psychology, business, and education, are drawn to the study of simulation, immersion, and cultural learning.

Since language is the primary element of cultural settings, cultural learning in particular is strongly related to language learning since students cannot genuinely master the desired language unless they have also understood cultural contexts. Real-time communication and physical-virtual immersion are crucial components of culture and linguistic education. For greater immersion, augmented reality (AR) technology can be used to seamlessly combine virtual objects with real-world images. Adding augmented reality to remote engagement implies that people can communicate with other people or things without physically being there. We finally join the image after leaving the prehistoric cavern paintings, the paintings created by panoramists, photographers, and videographers. If we track the development of the representation device, we can see that we are moving towards a time of "frameless pictures," which will force us to start over from scratch. This is how Augmented Reality is altering the conventions of social science and historical teaching and learning.

F. Augmented Reality for Mathematics Education:

An integrated STEM (Science, Technology, Engineering, and Mathematics) class calls for active participation and the development of students' interests in situations that occur in real life. Although embedded STEM content is rarely taught by school teachers, real-world STEM problems are inherently incorporated. Mathematics is one of the toughest subjects in that field. Solid geometry is a type of mathematics subject. A study has been done to include Augmented Reality (AR) technology into teaching operations and build a learning scheme that aids junior high school students in studying sound geometry in order to provide a better experience when learning solid geometry. According to the study's findings, augmented reality truly accelerates the acquisition of solid geometry.

Another study focuses on the use of augmented reality (AR) in math's teaching and learning, which makes the most of this technology by giving students a hands-on opportunity to engage with ground-breaking solids. The study's conclusion revealed that Augmented Reality helps with the comprehension of computing solids of revolution volumes. Due to their close ties to processing power and computational calculations, AR techniques have evolved in tandem with the advancement of personal computers. It is imperative to start by mentioning some of the works that have been produced as a result of the use of these methodologies at the national and international levels, particularly in the fields of education and teaching.

With, it is clear that AR has been connected to mathematics since its inception. Because AR offers better visualization and interactivity, mathematical concepts are easier to understand. Thus, it follows that three-dimensional methods, like augmented reality, enhance the teaching and learning of mathematics. In addition to the need to better understand how mobile devices are used in many countries to learn mathematics, there is a strong political will to improve mathematics education in order to support innovation that spurs economic growth and prepare tomorrow's workers for future job markets.

G. Augmented Chemistry:

Through augmented reality (AR), augmented chemistry serves as an interactive teaching workbench that can explain to pupils how and what makes up an atom or a molecule. To complete this assignment using both hands, three items are needed: a booklet, a gripper, and a cube. The pamphlet identifies each component with a name and a printed image.

Using a gripper with a button to attach an atom to the molecular model, one hand flips through the booklet. Users initially move the gripper around the piece in the booklet to learn more about it by clicking the gripper's button. Users then position the gripper near to a platform, a cube that contains a molecule. Subsequently, by rotating a cube operated by the other hand, users can determine where and how the element connects to the molecule.

H. Augmented biology:

In biology, AR can be used to investigate the

skeleton and anatomy of the human body. By using 3D computer-generated models in actual classroom settings, the Specialist Schools and Academies Trust (SSAT) demonstrated how teachers may employ augmented reality (AR) technology to explain what human organs are made of and how they appear. Additionally, using their camera-equipped laptops and AR markers that link PCs with AR data about the biological features of the human body, students may be able to study human organs on their own.

Conclusion :

According to research, augmented reality (AR) can enhance education more effectively than other upgraded technological settings. When learning material in 3D, objects can be moved about and data may be handled interactively. The face of education has chnged as a result of the rapid advancement of technology, especially when it is used in conjunction with effective pedagogical principles. This combination has created novel opportunities to improve the caliber of teaching and learning. The attention produced in corporate and industrial circles, as well as the discussion in popular periodicals and research papers in the learning and training domains, indicate that augmented reality has a promising future as a visualization tool. Given the expenditures required for research and design, several problems remain regarding efficiency and when compared to conventional methods. However, there is a lot of hope for the future of AR in education and training. In addition to being strong and portable enough to give augmented reality (AR) experiences via desktop and mobile devices, new technologies and information communications are also highly developed and intelligent enough to seamlessly integrate the actual world with augmented reality.

References:

1. C. M. Jung, Timothy; tom Dieck, Augmented Reality and Virtual Reality: Empowering Human, Place and Business, vol. XI, no. 5. 2018.
2 I. M. Kochi, Masami; Harding, Russell; Campbell, Diarmid Archibald; Ranyard, David; Hocking, "Apparatus And Method For Augmented Reality," vol. 2, no. 12, 2017.
3. M. H. Hilliges, Otmar; Kim, David; Izadi, Shahram; Weiss, "Graspng Virtual Objects In Augmented Reality," vol. 1, no. 12, 2018.
4. J. bos, jeffrey charles; pasquero, "system and method for indicating a presence of supplemental information in augmented reality," vol.2,no.12,2017
5. M. Habashima, Yoshiyuki; Kurosawa, Fuminobu; Alaniz, Arthur; Gleeson-May, "System And Method For Providing An Augmented Reality Vehicle Interface," Vol. 1, No. 12, 2017.
6. P. Chen, X. Liu, W. Cheng, and R. Huang, "A review of using Augmented Reality in Education from 2011 to 2016," pp. 13–18, 2017
7. M. Fernandez, "Augmented-Virtual Reality: How to improve education systems," High. Learn. Res. Commun., vol. 7, no. 1, p. 1, 2017, doi: 10.18870/hlrc.v7i1.373.
8. V. Marín-Díaz, "the Relationships Between Augmented Reality and Inclusive Education in Higher Education," Bordón. Rev. Pedagog., vol. 69, no. 3, p. 125, 2017,
9. F. Saltan, "The Use of Augmented Reality in Formal Education/ : A Scoping Review," vol. 8223, no. 2, pp. 503–520, 2017
10. H. Tobar-Muñoz, S. Baldiris, and R. Fabregat, "Augmented Reality Game-Based Learning: Enriching Students' Experience During Reading Comprehension Activities," J. Educ. Comput. Res., vol. 55, no. 7, pp. 901–936, 2017
11. D. N. E. Phon, M. B. Ali, and N. D. A. Halim, "Learning with augmented reality: Effects toward student with different spatial abilities," Adv. Sci. Lett., vol. 21, no. 7, pp. 2200–2204, 2015.
12. Y. H. Wang, "Using augmented reality to support a software editing course for college students," J. Comput. Assist. Learn., vol. 33, no. 5, pp. 532–546,2017
13. C. Moro, Z. Štromberga, A. Raikos, and A. Stirling, "The effectiveness of virtual and augmented reality in health sciences and medical anatomy," Anat. Sci. Educ., vol. 10, no. 6, pp. 549–559, 2017

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