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Using Holograms in Teaching

MOHAMED SALLAM
Faculty of Education, Ubari (A branch of Sebha University)
Moha.salam@sebhau.edu.ly, sallam54@hotmail.com

KHALED ABDUSALAM AYAD
Faculty of Science and Natural Resources, Al Jafara University
Kaaayad@yahoo.com

SALMA ALI ALGJAMYA
Faculty of Engineering Technologies – Yefren
salmaalgjamya@gmail.com

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A B S T R A C T

Holograms for teaching are an advanced teaching tool that enhances the efficiency of student participation in the process of learning. The three-dimensional visualizations in holograms will give students a better opportunity to achieve knowledge interactively and entertainingly, which could explain some very complex concepts better and help provide better understanding. This would help students visualize what they cannot view directly with ordinary means: anatomy, historical items, scientific models, etc. Besides, holograms can enable distant learning through the realistic and life-like representation of subjects, beating the barriers of geographical distance. Though there are challenges, including cost and technical limitations, the potential of holographic learning tools in classrooms is huge; these make education more dynamic and engaging.

1. Introduction

Nowadays, the methods and ways of teaching are somewhat different from those a few years ago. The invention of the computer has revolutionized our way of living [1]. In education, the computer is seen as a vital learning tool that enables students, teachers, and other staff to conduct a learning experience. Generally, it is significant that everybody learns the use of a computer despite their qualification or background. The rapid development of technology has significantly impacted the education sector by introducing advanced tools to the teaching and learning process. Some of the most promising new technologies involve holography, bringing 3D holograms into teaching environments. Holographic technology allows students to engage with information in an immersive and interactive way, thus improving engagement, comprehension, and retention. As educators seek to explore new avenues for instruction, holograms introduce a revolutionary approach to delivering complex information in a more visual and dynamic way.

2. E-learning

E-learning

This is the key to the end goal of the learning process: to help individual performance and development, and e-learning is not the exception that confirms the rule. It is that form of learning that uses electronic means for delivery and administration of that experience via 24 computers either networked or standalone, implementing web technology or not, supervised or self-paced.

3. What is E-learning

What is E-learning

Nowadays, in the era of the internet, it is usual to transform any word using the prefix e in order to obtain another one with a totally different meaning, for example: in e-commerce to refer to electronic commerce, e-banking, electronic banking, e-mails, electronic mail, and e-learning, E-learning, e-learning or eLearning to electronic learning [2]. Rosenberg (9) argues that ―e-learning refers to the use of the internet technologies to deliver a broad array of solutions that enhance knowledge and performance‖. He adds that e-learning ―is based on three fundamental criteria‖ [3]:

1. It is networked, allowing for quick updating, storage/retrieval, distribution and the sharing of instruction or information [4].
2. It is delivered to the learner over a computer via standard web technologies.
3. It has focus on a broad perspective of learning – a learning solution that goes beyond the conventional boundaries of training [3].

The main objective of the learning process is enhancement of individual performance and development. E-learning also known as online learning has to do with how people learn and communicate using electronic media. It is a form of learning that uses electronic means to deliver information. This may be carried out via a computer, either networked or standalone, supervised or self-paced, or by implementing web technologies. Generally, the use of e-learning allows one

to update, expand or restore one's knowledge and improve their performance by utilizing information and 25 Communication technology ICT to communicate traditional paradigms of training in an immediate and accessible way. E-learning can be categorized into four groups, namely: [5] 1-Online learning. 2-Web-based learning 3- Computer-based learning 4-Distance learning.

4. Why E-learning

Why E-learning Web-based learning technologies are providing more opportunities for anyone to learn. There are lots of different people around the world who want to learn at different times and different places but at less cost due to economic and time-related constraints [6]. Economic reasons including little income makes the payment of traditional course fees difficult for students [7]. Time is a crucial issue for those who are involved in full-time work since they cannot manage to attend classes at any particular time. Their residence also constrains people living far away from a college or university; a traditional classroom environment prevents them in attaining education. For all that, e-learning has offered the chance to learn. On one hand, it is not obligatory for the class to be held at a certain time; every student can join at whatever time they wish provided that the course is completed within the given time frame. In addition, course fees are not that expensive and this attracts those who cannot afford to pay traditional course fees [8]. E-learning thus allows learners to collapse time and space since they are able to learn at their own pace. Studying via internet technologies can also offer more help to students alongside their traditional classes [44].

5. What Are Holograms?

What Are Holograms? Holograms are 3D images formed by the interference of light beams that can be viewed without special glasses. Unlike traditional 2D images or videos, holograms create a sense of depth, making objects appear as if they exist in physical space.[11] This technology has been widely used in entertainment, medical imaging, and now, education. With the integration of augmented reality (AR) and virtual reality (VR), holography is paving the way for a more immersive teaching experience, allowing educators to present content in a highly engaging and interactive way.[10]

6. Impact of Holograms on Teaching

Impact of Holograms on Teaching 1. Increased Student Engagement, figure 1, and Motivation: Holograms create a dynamic learning environment by capturing students' attention and sustaining their interest. Generally speaking, traditional lecture-based teaching cannot help students maintain focus throughout the sessions. This, however, becomes encouragingly interactive with holographic involvement due to its interactive and visual nature. By turning passive learning into an interactive experience, holography ensures lessons are more interesting and motivating for students. 2. Improved Understanding and Comprehension: Most of the concepts

taught at school, and mainly those of science, technology, engineering, and mathematics, are not that easy to comprehend with the help of textbooks or flat images. Holograms present these in three dimensions for better understanding and accessibility. Students in biology class can work with detailed 3D models of human anatomy, observing organs from multiple angles and even interacting with virtual simulations of bodily functions.

3. Catering to Practical Learning and Skill Development: Holographic technology finds great applications in subjects that demand practical exposure, such as medicine, engineering, and architecture. Instead of purely theoretical explanations, students engage in interactive simulations of real-time scenarios. For instance, medical students can practice virtual surgeries or digital cadaver dissections, developing their practical skills without ethical issues or resource constraints.

4. Navigating the Gap between Remote and On-Site Education: The boom in online studies has called for a need to devise methods that assure student engagement when physical contact does not exist. Hologram technology allows teaching professionals to incorporate a virtual learning environment where real-time interaction occurs between participants and instructors. In such a way, collaboration and effectiveness are enhanced, allowing remotely conducted learning to be truly engaging.

5.Transforming Traditional Teaching Methods: The integration of holograms encourages a shift from traditional rote memorization to experiential learning. Instead of merely reading about historical events, students can witness3D holographic reenactments[12]. In chemistry, students can manipulate molecular structures and observe chemical reactions in real time, making learning more interactive and enjoyable.

6. Special Needs Supported: Using holograms in education makes learning truly inclusive, allowing for various learning styles and needs to be taken into consideration. The visually impaired can work with 3D holograms that are audio-assisted, while the hearing-impaired benefit from sign language holographic interpreters.[13] Offering alternative modes of presenting information helps holograms create an accessible learning environment for students of all kinds.

Figure1: Hologram Teaching

Despite these challenges, it is worth noticing that the integration of holograms into teaching would be difficult and fraught with drawbacks. The expenses for hardware and software are extremely high, with specialized training needed for teachers in addition to limited technology that will dampen this dream of general diffusion. Balancing traditional methods of teaching with holographic methods will be the key to allowing all students-what technological change may come their way-to benefit.

7. Future of Holography in Teaching

Future of Holography in Teaching While the technology is developing, prices for holographic solutions will be going down and thus becoming increasingly affordable for more and more educational institutions around the world. Further developments could be made: AI-powered holographic tutors, interactive virtual labs, and personalized learning to meet the needs of every single student. With increased investment in research and collaboration between educators and technology companies, holography will no doubt find its place in modern education.

8. Conclusion

Conclusion

Holograms can revolutionize teaching by creating an immersive, interactive, and very effective learning environment. Beyond increasing engagement, they enhance understanding, allow for practical learning, and facilitate inclusive education. While there are many challenges, with the continuous development of technology, holography is bound to be one of the central tools in the modern classroom. By integrating holograms into teaching methodologies, educators will be better equipped to prepare students for their future in which technology and education will blend together seamlessly.

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