**Statistical Study on Increasing Usage of AR/VR in Real World**

**Abstract**

Augmented and Virtual Reality have emerged as powerful technologies to learn skills, revolutionizing the way people learn skills related to various fields. This study provides an overview of their impact on skill acquisition, how does it improve the process of learning a skill and what aspects make it different from traditional learning and its future prospects in this direction. In this research paper we explore how environments created by AR/VR facilitate experiential learning, improve motor skills and enhance a wide range of mental/cognitive processes. The implications of AR/VR technology for training programs, professional development, and educational setting are also studied and discussed.

**1. Introduction**

Augmented Reality (AR) and Virtual Reality (VR) are two great technologies that have evolved the way people interact with the digital world. AR is the technology to add digital elements to the real world around us, while VR is the technology to create immersive digital environments that may or may not replicate the real world in sense and form. Both technologies use special equipment such as headset or glasses to bring these experiences to life.

**AR**

Augmented reality (AR) can be considered as an enhanced version of the real world, achieved through the utilization of digital information and projecting to show in semblance with the real-world environment. At the core of it AR is used to add features to real world using computer generated digital information, whether the features are for utilization or display they all add new information to our interpretation of the real-world environment that elevates our experience towards the said environment. AR can be utilized through multiple senses including visual, auditory, touch etc. AR technology uses computer hardware and software for example apps, consoles, projections etc., to combine digital information with the real-world environment.

It is growing trend among companies developing metaverse implementations such as mobile computing and business applications, to use AR as in their implementation.

Various fields which have applications for AR include gaming, product visualization, marketing campaigns, architecture and home design, education etc.

**What is virtual reality?**

Virtual reality refers to a simulation of a 3D environment that allows users to explore and interact with the said virtual surroundings in a way that may or may not approximate reality, as perceived through the users’ senses. Whether or not the interaction with the 3D environment will approximate to reality would depend on the purpose of the creator of said virtual environment. The 3D environment is created using relevant computer hardware and software, while users need helmets and goggles to interact with the environment. The development of VR technology is aiming for a direction wherein the users would be immersed in the created environment in such a manner that the virtual surroundings would be indistinguishable from reality in all senses.

**Education and skill training**

Education has always been an important area of application for VR systems so that students could efficiently train for real life activities. The appeal of simulations was exactly that they can provide training that could stand equally with practice with real systems, adding the reduced cost and greater safety along with that made it tree worth growing for companies. This was particularly found in the case of military training, where the first significant commercial application of simulations was seen, it was pilot training simulators used in the 2nd World War. Such simulators relied on visual-motion feedback to augment the sensation of flying while the user is seated in a closed mechanical system placed on the ground.

An important area of application for VR systems has always been training for real-life activities. The appeal of simulations is that they can provide training equal or nearly equal to practice with real systems, but at reduced cost and with greater safety. This is particularly the case for military training, and the first significant application of commercial simulators was pilot training during World War II. Flight simulators rely on visual and motion feedback to augment the sensation of flying while seated in a closed mechanical system on the ground.

As highlighted above, AR/VR technology enhances the learning process of people in various domains and fields through simulations which may put people in various positions by simulating various situations or examples of situations, thereby enhancing experiential learning. This point can be further enunciated with examples of other fields as well, simulated surgical training and skill improvement is known to be one of the most revolutionary uses of AR/VR technology in the healthcare industry, in countries like Netherlands, and United kingdom the police departments is being trained using AR/VR technology to train them for various emergency scenarios, companies like Walmart have also implemented VR training programs to train employees in various departments etc.

**Increasing Usage and Adoption**

(introduction regarding increasing usage and adoption of AR/VR in various fields and name of some software)

The global shipments of AR/VR headsets were 5.5 million units in 2020 and are projected to reach 43.5 million by 2025.The market size of VR headsets was $5.5 billion in 2019 and is projected to reach $18.6 billion by 2026.The global AR/VR software and hardware market size was valued at $2.6 billion in 2020, which will jump to $5.1 billion by 2023.[1]

- The AR market is projected to hit a value of $50 billion by 2024.

Industry Adoption:

- The strongest demand for AR/VR currently comes from industries in the creative economy—specifically, gaming, live events, video entertainment, and retail.

- AR/VR technologies have increasingly been employed by a wide range of sectors —from education and healthcare to retail and real estate.

- AR technology blends the physical and digital worlds - be it gaming or consumer goods, AR and VR help businesses provide a better experience to their customers.

Various applications and software for AR/VR which are widely popular include things like OSSOVR(a clinically validated surgical training and assessment platform designed for medical device companies and practicing surgeons of all skill levels), PokemonGo(a popular**augmented reality (AR)**mobilegamedevelopedby**Niantic**incollaborationwith**The Pokémon Company**and**Nintendo**.) for Gaming, Tilt Brush(is a powerful tool for creative expression in VR) for Painting, Enscape( a real-time rendering and visualization plugin for architectural software like **Revit**, **SketchUp**, and **Rhino**) for architectural design**, Hyundai Virtual Guide(** An AR smartphone application by Hyundai that owners can use to understand their vehicles better), **Toyota’s TeenDrive 365 (**Toyota employs simulation of driving environment to prove the aftermath of negligent driving with the help of their software) etc.

This Research paper will further explore and discuss such innovations, their degree of benefit and effectiveness, as well as further and upcoming implementations. This study will mainly employ existing literature, case studies and empirical research to elucidate the role of AR/VR technology in shaping the future of skill acquisition and lifelong learning.

**2. Related Work**

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| Reference | Subject | Method | Findings |
| Abdullah M. Al-Ansi | AR and VR development in Education | Analyzing | Adoption of AR and VR in education recent years |
| Dr A Udaya Shankar | Impact of AR and VR in Education | Literature Review | Improvement in teaching and learning experience |
| Patrice Labedan | VR in pilot training | Case Study | Cardiac activities during training |
| Zain Hussain | Use of AR and VR for improving knowledge and skills in medical students | Randomized Trials and Pre-test, Post-test | Effectiveness of AR/VR devices for teaching medical students |
| Min-Chai Hsieh | AR for primary marine wildlife education | ADDIE model with Pre and Post test | Using augmented reality to enhance learning experience of children for marine wildlife education |
| İbrahim Yaşar Kazu | Engagement of AR and VR in higher studies | Data Analysis | VR's adaptability and potential for personalized learning experiences contributing to more efficient and effective learning |
| Jing Zhang | Trends in the Use of Augmented Reality, Virtual Reality, and Mixed Reality in Surgical Research | Global Bibliometric and Visualized Analysis | [use of augmented reality (AR), virtual reality (VR), and mixed reality (MR) in surgical research](https://link.springer.com/article/10.1007/s12262-021-03243-w) increased globally |

**Al Ansi et al.** analysed the recent developments of AR and VR in education by studying various publication and graphing out the distribution of publications that talk about the implementation AR/VR for education in any of the various field. Their paper proved the dramatic increase in AR/VR research in the preceding decade, the exponential growth of AR/VR adoption in education during the covid-19 pandemic, how AR/VR enhances communication and interactions between students and teachers in e-learning. Similarly, **Dr A Udaya Shankar et al.** conducted a literature review on the impact of AR and VR in education, proving the strong relationship between AR/VR and its impact on education. The study what descriptive in nature, and used questionnaires as well. The findings showed an improvement in teaching and learning experiences. **Patrice et al.**  conducted a case study on VR in pilot training. The findings focused on cardiac activities during training. **Zain et al.**  used randomized trials and pre-test, post-test methods to study the use of AR and VR for improving knowledge and skills in medical students. The findings showed the effectiveness of AR/VR devices for teaching medical students. **Min-Chai Hsieh** applied the ADDIE model and pre-test, post-test methods to study the use of AR for primary marine wildlife education. The findings concluded that using augmented reality enhances the learning experience of children for marine wildlife education. **İbrahim Yaşar Kazu** performed data analysis on the engagement of AR and VR in higher studies. The findings showed that VR’s adaptability and potential for personalized learning experiences contribute to more efficient and effective learning. Lastly, **Jing Zhang** conducted a global bibliometric and visualized analysis on trends in the use of augmented reality, virtual reality, and mixed reality in surgical research. The indicates a clear global increase in the use of augmented reality (AR), virtual reality (VR), and mixed reality (MR) in surgical research, with the USA leading in contributions and emerging trends suggesting a continued rise in the future.

Comparative study

Discussion

Conclusion