



# Revolutionize Education Through AR and VR by 5G Technology

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**Abstract:** We will focus on applications that use Augmented Reality (AR) and Virtual Reality (VR) in educational settings, in this paper exploring the use of 5G technologies. After introducing a few scenarios using AR/VR approaches, it describes the characteristics of 5G and illustrates how it can be applied to education. By using AR and VR to annotate the environment, it facilitates the sharing of knowledge in the education field. Enhancing the learning environment with augmented reality (AR) will add new information. 5G technology will only be able to guarantee high-quality 360° video, low-latency two-way interactions, and precise location and orientation of users. Therefore, it allows educators to deliver educational experiences in a variety of innovative ways, including through mobile devices, remote access, and remote mobility.

**Keywords:** Augmented Reality (AR), Virtual Reality (VR), 5G technology, Low Latency, Educational experiences

## I. INTRODUCTION

It is useful in the field of education as it facilitates the sharing of knowledge by providing annotations of the environment by using AR and VR. The use of augmented reality (AR) enhances the learning environment by adding additional information. It facilitates integrating the learning experience of impaired students through appropriate visual, auditory, and haptic interfaces. VR is a technology that allows substituting a virtual environment for the real-world one it provides a real-time user experience using visuals. Despite both AR and VR providing users with immersive experiences, they require a system that guarantees high-quality 360° video, low-latency two-way interactions, and precise location and orientation of the users, and also it will attain only because of 5G technology. Thus, it provides educational experiences that can also be enjoyed via mobile devices, remote access, and remote mobility, which opens up a variety of innovative learning scenarios. These technologies have been used in some already-available educational experiences, which are discussed along with their didactic implications and limitations as a result of current technological capabilities. A study of the potentialities of 5G technologies is conducted, by examining the performance and contents offered by the trials so far conducted, and by exploring how cloud and edge infrastructures are leveraging 5G to manage content, when compared with the modality (in-person vs. remote vs. mobile). Through this study, we can show how AR and VR can be utilized for in-person and remote learning, and how advances in networking can help solve these issues and open up new avenues for education.

## II. METHODOLOGY

This paper analyzes the concept of bringing the 5G in Education by implementing the emerging features of AR and VR for the students by deploying the Methodology of these 6 phases. It is been proven to the real-time solution brought before the Research, see Fig. 1.

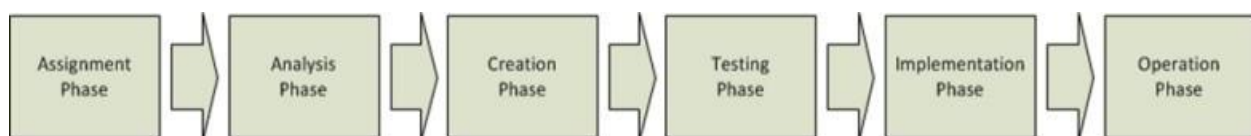


Fig. 1. Phases of methodology



III. MODELLING AND ANALYSIS

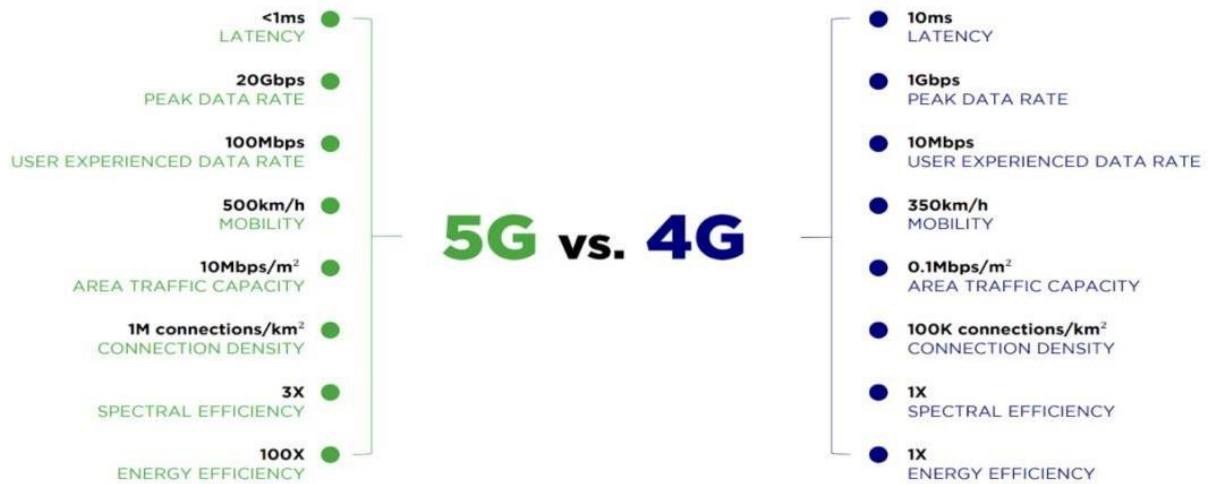


Fig. 2. Difference between 5g vs 4g



Fig. 3. Development process of teaching

IV. RESULTS AND DISCUSSION

Virtual reality and augmented reality have existed in various forms for more than two decades. Additionally, the method's cost discouraged its use in education beyond experimental studies. Low-cost devices that use smartphones are now making virtual reality more accessible to the general public. Virtual reality and augmented reality are discussed and how they can be used to enhance teaching in this paper, which examines the benefits and drawbacks of using them in the classroom. It reviews how the technologies have been used in education so far and it has been increased in using the technologies given in Fig. 4.

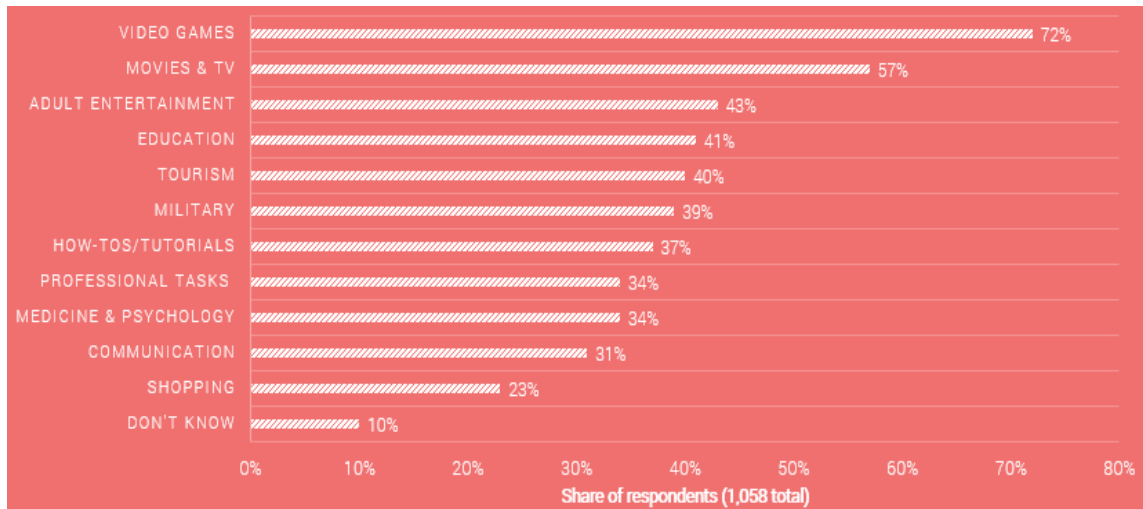


Fig. 4. Usage of AR &amp; VR

## V. CONCLUSION

As a result of this study, the existing technology of Augmented Reality (AR) and Virtual Reality (VR) in the field of evolution was integrated with the 5G Network enabling the technology to be developed and resulting in a revolution in education. Utilizing a VR headset for demonstrations and educational purposes enhances the education feature to the next level. The flow of visual and object information within the image is efficiently transferred, bringing a deeper understanding to the core in the most natural way. 5G technology ensures high-speed bit transfers for online teaching while meeting more features. Though it was expensive it will be implemented by deploying in the big world abstract in the small device i.e., smartphones. Students enabled using this technology get benefitted from the speed and reliability of the 5G technology.

## REFERENCES

- [1] Philipp A. Rauschnabel, Reto Felix, Christian Hinsch, and Hamza Shahab "What is XR? Towards a Framework for Augmented and Virtual Reality", Nov-2021
- [2] Botir Usmonov, Radjabov Ozod Sattorovich and Rustamov Umedjon Amrillojonovich "5g Technology Evolution" Conference: 2019 International Conference on Information Science and Communications Technologies (ICISCT), Nov-2019
- [3] Gac, P.; Richard, P.; Papouin, Y.; George, S.; Richard, "Virtual Interactive Tablet to Support Vocational Training in Immersive Environment". In Proceedings of the 14th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications, Prague, Czech Republic, 25–27 February 2019.
- [4] Marín-Morales, J.; Higuera-Trujillo, J.L.; Greco, A.; Guixeres, J.; Llinares, C.; Scilingo, E.P.; Alcañiz, M.; Valenza, "Affective computing in virtual reality: Emotion recognition from brain and heartbeat dynamics using wearable sensors". Sci. Rep. 2018
- [5] Murcia-Lopez, M.; Steed, "A comparison of virtual and physical training transfer of bimanual assembly tasks". IEEE Trans. Vis. Comput. Graph. 2018.
- [6] Makhataeva, Z.; Varol, "Augmented Reality for Robotics: A Review". Robotics 2020 October 21.
- [7] Kaplan, A.D.; Cruick, J.; Endsley, M.; Beers, S.M.; Sawyer, B.D.; Hancock, P. "The Effects of Virtual Reality, Augmented Reality, and Mixed Reality as Training Enhancement Methods: A Meta-Analysis". Hum. Factors 2020, 0018720820904229.
- [8] Rokhsaritalemi, S.; Sadeghi-Niaraki, A.; Choi, "A Review on Mixed Reality: Current Trends, Challenges and Prospects". Appl. Sci. 2020.
- [9] Salah, B.; Abidi, M.H.; Mian, S.H.; Krid, M.; Alkhalefah, H.; Abdo, "Virtual reality-based engineering education to enhance manufacturing sustainability in industry 4.0". Sustainability 2019.
- [10] McMillan, K.; Flood, K.; Glaeser, "Virtual reality, augmented reality, mixed reality, and the marine conservation movement". Aquat. Conserv. Mar. Freshw. Ecosyst. 2017.
- [11] Lu, Y. "Industry 4.0: A survey on technologies, applications and open research issues". J. Ind. Inf. Integer. 2017.
- [12] Erol, S.; Jäger, A.; Hold, P.; Ott, K.; Sihm, "Tangible Industry 4.0: A scenario-based approach to learning for the



future of production”. Procedia CiRp 2016.

- [13] Jack Ratcliffe, Francesco Soave, Nick Bryan-Kinns, Laurissa Tokarchuk and Ildar Farkhatdinov. “Extended Reality (XR) Remote Research: a survey of drawbacks and opportunities”, University of London, London, UK. January 2021.
- [14]. Marepalli Sharath Kumar “Revolution of 5g Wireless Technology-Future Direction” IOSR Journal of Computer Engineering (IOSR-JCE) e-ISSN: 2278- 0661, p-ISSN: 2278-8727, Volume 21, Issue 4, Ser. III (Jul - Aug 2019)

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