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The Metaverse and the future of education

FRAMEWORKS, FEATURES POTENTIAL APPLICATIONS, CHALLENGES AND OPPORTUNITIES

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INTRODUCTION

Higher Education teaching practice is in significant flux as educators and other stakeholders reflect on the experiences of teaching and learning during the Covid-19 pandemic(Manifesto, 2020),.

The pandemic has accelerated thinking regarding the use of Extended Reality (XR) for universities, expressed clearly in the Immersive Learning Network's 2021 report on the opportunities, barriers and catalysts to XR in the education domain (Lee et al., 2021).

EXTENDED REALITY AND THE METATVERSE

Extended Reality (XR) is a broad term encompassing many related concepts, such as Virtual Reality (VR), Augmented Reality (AR), Augmented Virtuality (AV) and Mixed Reality (MR) (Palmas & Klinker, 2018).

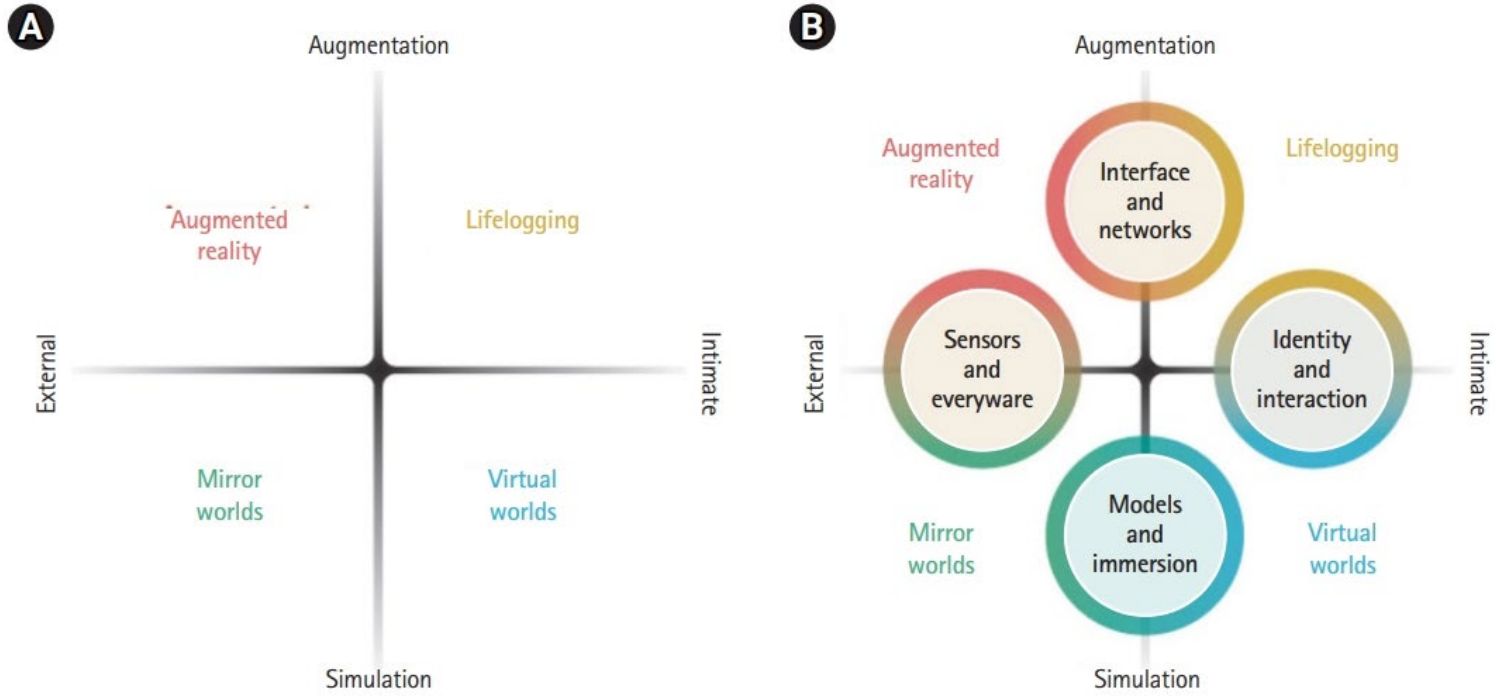
For years, augmented reality (AR), mixed reality (MR), and virtual reality (VR) have been viewed as standalone technologies that enable immersive experiences in the offline world. Businesses have continued to find ways to use these technologies to improve everyday experiences ranging from shopping to learning.

But we are now viewing these extend reality technologies through a new lens: as building blocks of the metaverse.

KEY FEATURES METAVERSE

- Collection of technologies
- Rapid and free access
- Convergence of the virtual and real world
- Digital identity
- Immersive and multisensory experience
- Decentralized and editable content

CHARACTERISTICS OF THE METAVERSE(1)



FRAMEWORK (2)

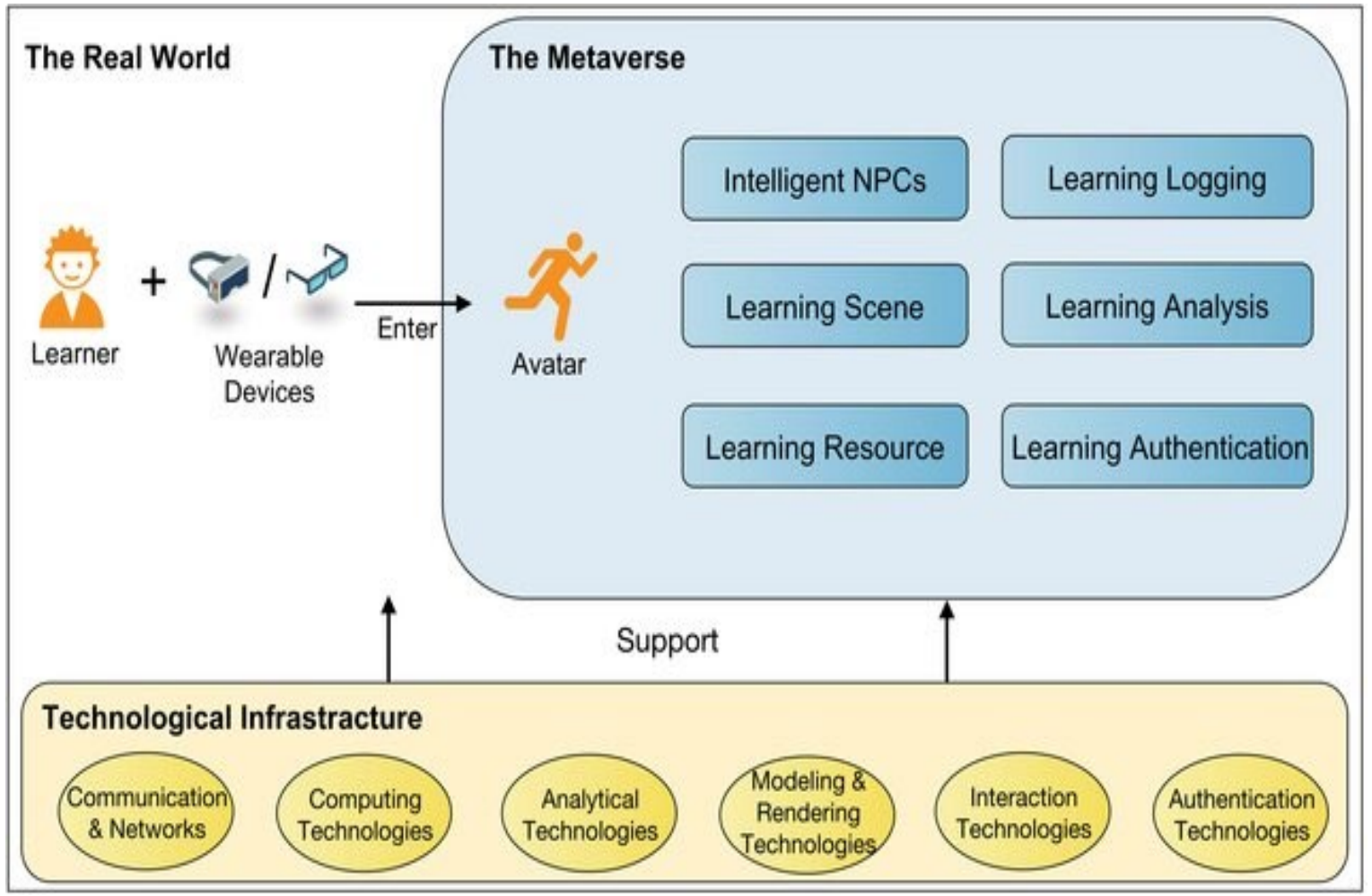
	Augmented reality	Lifelogging	Mirror world	Virtual reality
Definition	Building a smart environment by utilizing location-based technologies and networks.	Technology to capture, store, and share everyday experiences and information about objects and people.	It reflects the real world as it is, but integrates and provides external environment information.	A virtual world built with digital data
Features	Building a smart environment using location-based technology and networks	Recording information about objects and people using augmented technology	Virtual maps and modeling using GPS technology	Based on interaction activities between avatars that reflect the user's ego
Applications	Smartphones, vehicle HUDs	Wearable devices, black boxes	Map-based services	Online multiplayer games
Use cases	Pokemon Go, Digital Textbook, Realistic Content	Facebook, Instagram, Apple Watch, Samsung Health, Nike Plus	Google Earth, Google Maps, Naver Maps, Airbnb	Second Life, Minecraft, Roblox, Zepeto

THE METAVERSE AND EDUCATION

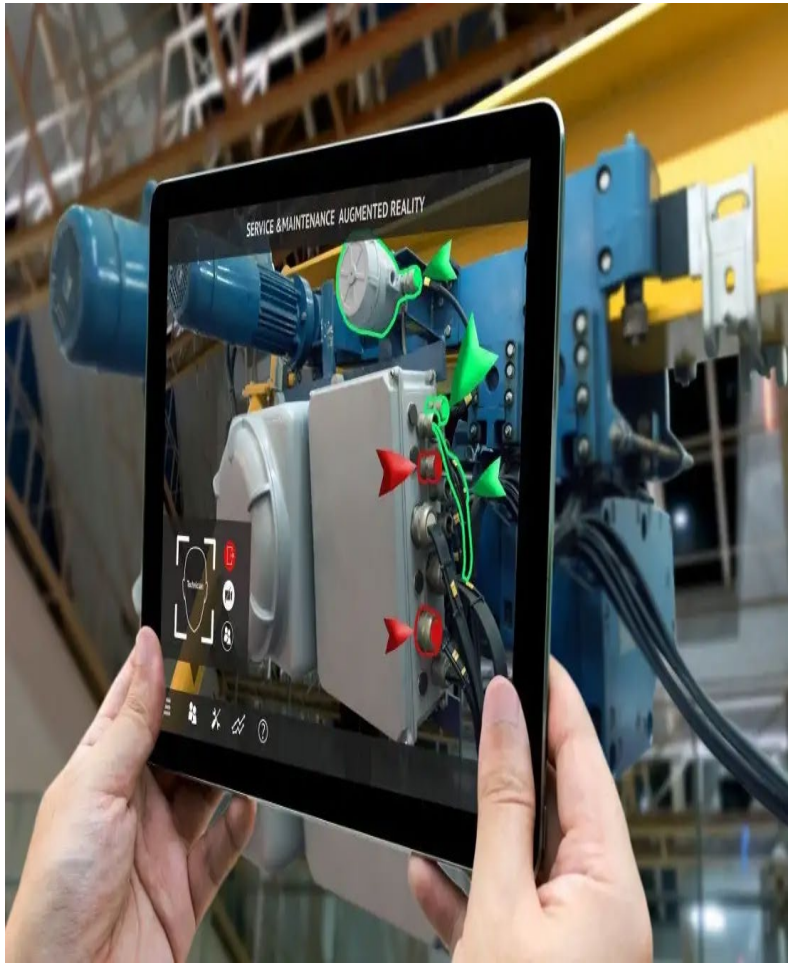
It is time to consider the adoption of customizable Metaverse platforms where educators and their students can safely teach and learn again in the same space.

The main reason for adopting the metaverse in education is to provide an immersive learning experience.

METAVERSE IN EDUCATION FRAMEWORK



AUGMENTED REALITY



Technological characteristics	Educational implications
- Overlay virtual objects in the real world to make the object 3D and real	- Learn invisible parts visually and 3-dimensionally through virtual digital information, and effectively solve problems
- Adding fantasy to the thread (e.g., Pokémon Go on the street, Zepeto, which recognizes faces and creates 3D avatar)	- In-depth understanding of content that is difficult to observe or explain in text, and learners can construct knowledge through experience
- Effectively emphasizing information and promoting convenience (e.g., HUD presented on the car glass)	- Interactive experiences such as reading, writing, and speaking are possible while immersed in the learning context.

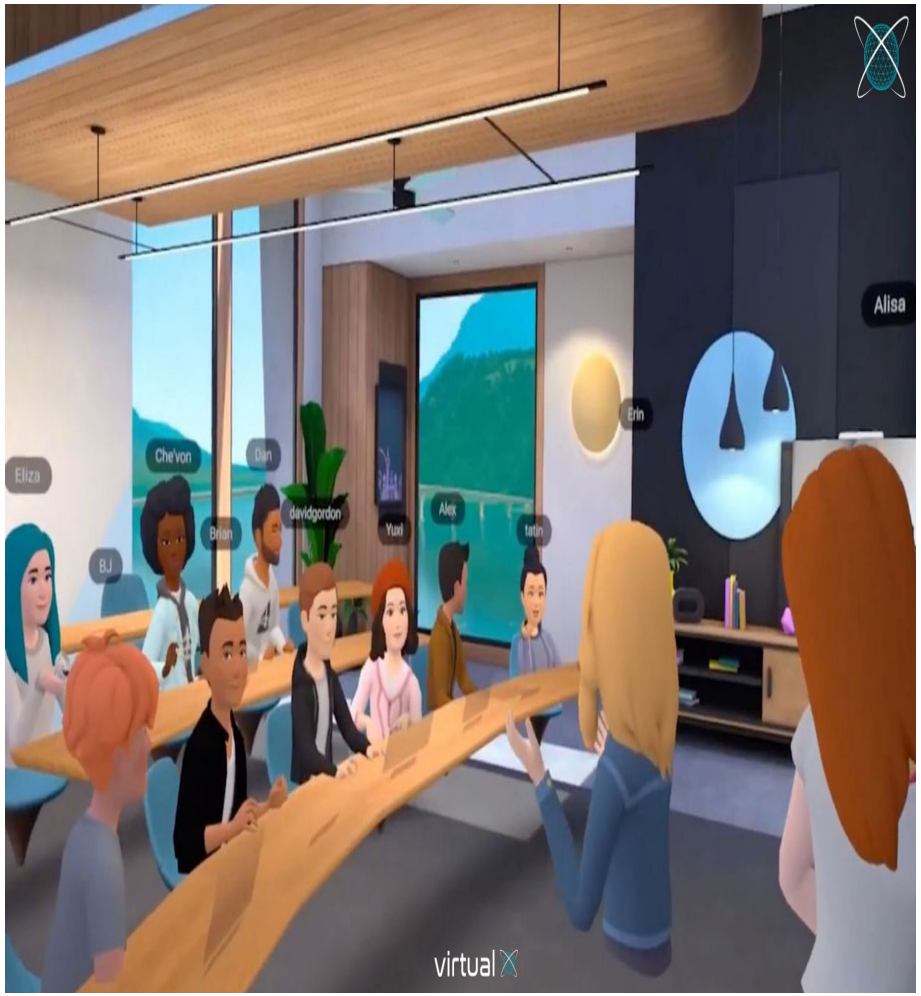
LIFELOGGING

Technological characteristics	Educational implications
- One's daily life and thoughts are productively contented and shared through social media and SNS (e.g., blogs, YouTube, Wikis, etc.).	- Review and reflect on one's daily life, improve the ability to represent and implement information in an appropriate direction, and feedback from others on social networks leads to reinforcement and rewards.
- Network technology forms relationships with others online, communicates quickly, and records various social activities (Facebook, Band, Twitter, etc.).	- Critically explore various information on the lifelogging platform, and creatively reconstruct information through collective intelligence.
- Personal activity information is accumulated and analyzed through various sensors of the internet of things and wearable devices to create added value (e.g., health tracking including Nike Plus).	- Reflect on learning and improve it based on analytics data related to learning (e.g., dashboard).
	- Teachers promote learning in a customized direction based on students' learning log data, provide appropriate support, and prevent dropouts.

MIRROR WORLD

TECHNOLOGICAL CHARACTERISTICS	EDUCATIONAL IMPLICATIONS
- Expanding the real world by combining GPS and networking technology (e.g., Google Earth, various map applications, etc.)	- Overcoming the spatial and physical limitations of teaching and learning, learning takes place in the metaverse of the mirror world.
- Implementation of the real world into the virtual world as if reflected in a mirror for a specific purpose (e.g., Airbnb, Minerva School, food ordering app, taxi call, bus route guidance, parking lot finder app, etc.)	- Conduct online real-time classes through online video conferencing tools and collaboration tools (Zoom, WebEx, Google Meet, Teams), which are representative mirror worlds.
- However, it does not contain everything in reality. In other words, it effectively expands the real world to increase fun and play, flexibility in management and operation, and collective intelligence (e.g., Minecraft, Upland, Digital Lab, etc.).	- Through the mirror world, learners can realize “learning by making” (e.g., in Minecraft, students build and restore historical structures—Bulguksa, Gyeongbokgung, Cheomseongdae, Taj Mahal, Eiffel Tower, etc. Users can experience their digital heritage and deepen their understanding of history and culture.

VIRTUAL REALITY



- Through sophisticated computer graphics work, especially in a virtual environment implemented with 3D technology, users enjoy various games through a seamlessly connected interface (e.g., various 3D games including Roblox).	- Practice can be performed through virtual simulation in environments that are difficult to produce due to high costs and high risk (e.g., fire scenes, flight control, dangerous surgery, etc.).
- In a space, era, culture, and characters designed differently from reality, they act as avatars rather than their original self, and have multiple personas.	- Users can have immersive experiences of times and spaces that cannot be experienced in reality, such as the past or future era.
- Chat and communication tools are included in virtual reality to communicate and collaborate with AI characters and others (e.g., multiplayer online games).	- Through 3D virtual world-based games (according to the characteristics and types of designed games), users improve strategic and comprehensive thinking skills, problem-solving skills, and learn skills necessary for the real world.

BENEFITS OF THE METAVERSE IN EDUCATION

The metaverse assists competency-based education

The metaverse assists inclusive education

The metaverse assists virtual experiment learning

The metaverse assists blended learning

The metaverse assists language learning

A new platform for social and educational interaction

Democratizing education access

CHALLENGES

- High cost of ER equipment
- Privacy and data security
- Ethics and morality
- Readiness of underlying infrastructure to support the educational metaverse
- Lack of familiarity with ER.VR environments
- Addiction

NEW RESEARCH DIRECTIONS

DESIGNING THE METAVERSE MODELS OR FRAMEWORKS FOR EDUCATIONAL PURPOSES

ENACTING THE METAVERSE RULES AND PRINCIPLES IN EDUCATION

INVESTIGATING ATTITUDES OF SCHOOL ADMINISTRATORS, TEACHERS, AND PARENTS TOWARDS ADOPTING THE METAVERSE FOR EDUCATIONAL PURPOSES

TEACHERS' PROFESSIONAL DEVELOPMENT IN RELATION TO THE METAVERSE

EXPLORING THE COGNITIVE AND NON-COGNITIVE IMPACT ON LEARNING OF LEARNERS WITH THE METAVERSE.

DEVELOPING AN EDUCATIONAL ASSESSMENT FRAMEWORK BASED ON THE METAVERSE OR EMPLOYING THE METAVERSE AS AN ASSESSMENT APPROACH

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Thank you!