

Libraries and the Metaverse: The Emergence of Virtual and Augmented Reality

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ABSTRACT

A relatively new, cutting-edge technology called the metaverse can completely transform the digital landscape and offer a more engaging user experience. The paper addresses the metaverse's layers and technologies, possible uses in library and information services, as well as its inherent difficulties. With the current surge in interest in metaverse technology, most of the material was discovered on websites and blogs, with a small number of scientific journals. After analyzing those studies, the researchers have attempted to visualize how the metaverse would be used in libraries in the future. The results demonstrate how libraries may use metaverse technology to provide more immersive and efficient virtual services, including virtual learning environments, virtual tours, virtual exhibitions, virtual reference services, and LIS conferences and events..

KEYWORDS: Metaverse, Metaverse in Libraries, Innovative Library Services, Emerging Technologies in Libraries, Virtual Library Services.

INTRODUCTION

From the advent of the internet to the present day, various innovative technologies have taken their place in the digital landscape. Digital technology has attracted enough attention after the COVID-19 pandemic. Metaverse has already found its way into various fields and tech companies like Facebook, Microsoft, Google and Nvidia have started investing in this technology. Metaverse is referred to by various names such as mirror world, 3D virtual world and extension of the internet. The concept of the metaverse became popular after the pandemic due to the widespread use of online and digital forms of communication. The idea of the metaverse is not new but gained a lot of attention after Facebook announced that the company would be rebranded as Meta on October 28, 2021, which is seen as the evolution of the metaverse. In the late 1970s and early 1980s, the technology community foresaw the metaverse as the future evolution of the internet. Attempts have also been made in the past such as Second Life, a technology developed by Linden Lab that allowed people to create a virtual avatar for themselves and live a second life in the virtual world (Ravi, 2022).

The term “metaverse” was first used in the 1992 science fiction novel “Snow Crash” by Neal Stephenson to describe a 3D virtual world in which humans are represented as avatars and can interact with each other (Patel, 2022). The novel gave an insight into the metaverse, where people entered the virtual world through digital avatars via virtual reality (VR) equipment and began to live in the metaverse. Stephenson’s vision of the metaverse was limited to virtual reality headsets, but the modern metaverse has a broader vision and incorporates other technologies for a fully immersive experience (Technologies, 2022). With the advancement of smart devices and breakthrough technologies, the metaverse will soon become a reality from its infancy (Wang et al., 2022).

Metaverse means beyond the universe. "Meta" for "beyond" and "verse" for "universe". In general, the metaverse is defined as an open and accessible 3D virtual world where users can create their digital avatars to virtually interact with other people and immerse themselves in performing virtual activities that provide real-life experiences. According to (Ning et al., 2021), "The metaverse provides an immersive experience based on augmented reality technology creates a mirror image of the real world based on digital twin technology builds an economic system based on blockchain technology, and tightly integrates the virtual and real worlds into the economic system, social system, and identity system, so that each user can produce content and edit the world".

APPLICATION OF METAVERSE IN DIFFERENT SECTORS

The metaverse is a new technological development that has the potential to change and influence every possible sector. Every sector and organisation has a different vision and different ways of using the metaverse, but there is no doubt that it will soon become a key driving force for the tech world, and the applications of the metaverse are countless in every industry (Technologies, 2022). The metaverse can enhance the gaming experience by appearing in a 3D virtual reality and developing its own content and building sub-games within a game, the fashion industry can connect its products to NFTs, e-commerce could offer customers a more personalised and immersive shopping experience, healthcare can use the metaverse for physical, telemedicine consultations and for healthcare training by providing computer-generated labs and virtual surgical training platforms (Patel, 2022). It offers artists and vendors new opportunities to use virtual worlds for the presentation, sale and purchase of digital artworks and much more in other sectors. The tourism industry is also exploring the metaverse and other virtual technologies to promote virtual travel in 3D space. With the help of gadgets and smart devices, people can take virtual tours around the globe and visit simulations of popular tourist spots in their original state (Neeti, 2022). Large companies have started to work on the realisation of the metaverse. Meta (formerly Facebook), for example, is planning to invest in augmented reality (AR) technology to expand its virtual world capabilities. Microsoft is working with Qualcomm on augmented reality (XR) and Holoportation technology, an immersive and interactive experience that will be built into mixed-reality applications. NVIDIA produces the Omniverse tool, which helps developers create applications for 3D simulation and design and allows users to create their realistic virtual avatar (Pritchard, 2022).

TECHNOLOGIES POWERING THE METAVERSE

Metaverse is the fusion of different technologies that together create an immersive user experience that bridges the gap between the real and virtual worlds. The different technologies that drive the metaverse are

- **Blockchain-** By using blockchain in the metaverse, decentralised and transparent solutions can be created for digital proof of ownership, digital collectability, transfer, regulating access and ensuring interoperability (Takyar, 2022; Wealth Quint, 2022).

- **Cryptocurrency-** Cryptocurrencies are operated using the blockchain to secure ownership of virtual land. They can be used as a medium of exchange to buy digital assets in the virtual 3D space.

- **Artificial Intelligence** - AI can recreate more realistic human avatars by analysing 3D scan images. To further enhance the digital experience, AI can be used to generate facial expressions, hairstyles, clothing and other features. AI algorithms can develop personalised avatars and intelligently recommend interesting goods or information to users in the metaverse (Wang et al., 2022).

- **Augmented Reality (AR) and Virtual Reality (VR)-** AR and VR are the backbone of the metaverse, providing users with a realistic 3D experience. AR augments the real-world environment with visual elements and graphic characters, such as in games like AR Dragon and Pokemon GO, which can be accessed with a digital device, or by using smart cameras to access the AR applications. VR can build a computer-generated digital world that users can access with VR headsets, gloves and digital sensors (Takyar, 2022). VR can be further expanded to enhance the virtual experience by incorporating simulations with VR equipment. These technologies are still in the development stage and would be mature to shape the future of the metaverse.

- **Internet of Things (IoT)-** This technology can connect any physical object to the Internet via sensors and devices. Each device has a unique identifier that can automatically send or receive information. This technology is central to bridging the gap between the physical and virtual worlds. The IoT can be used to send or receive data via sensors from the physical world and integrated into the virtual space to provide a more realistic experience of objects in the digital world (Takyar, 2022).

- **3D Construction-** The virtual replica of physical world objects can be created using 3-D spatial data and 4K HD photography that passes through the computer to process and create a virtual replica of objects (Binance Academy, 2022). It helps develop realistic and organic-looking spaces through 3D reconstruction using 3D cameras that create accurate 3D models of buildings, places and objects on the internet (Wealth Quint, 2022).

PROSPECTS OF METAVERSE IN LIBRARY AND INFORMATION SERVICES

The metaverse is a radical innovation that could bring about disruptive change in many areas of life. There have been previous attempts to create a library in the virtual world. Bell, Peters and Pope (2007) explained the development of the Alliance Second Life Library project. Second Life is a virtual, simulated world built and developed entirely by its users, known as residents. The Alliance Library System created the library in Second Life in 2006. The Metaverse has incredible possibilities and offers a completely new type of human-computer interaction and user experience. The prospects and possibilities of the metaverse in libraries are...

• **Virtual Reference Services-** Most users prefer to meet the librarian in person with their questions rather than seek virtual help. In the metaverse, users can communicate with libraries because it is much closer to a face-to-face meeting (Iyengar, 2022). The metaverse extends the visit of librarians and users to the 3D virtual library in their virtual avatars to resolve user queries and provide real-time personalised assistance to users. The metaverse is an evolution of the 2D virtual model and can provide librarians and users with a more immersive and engaging experience.

• **3D Virtual Library Tour** – The metaverse enables an immersive experience where users can virtually enter the 3D virtual world of the library in their virtual avatars to familiarise themselves with the different areas of the library, facilities, resources and services. This provides a more personalised experience than watching library tours on video. Users can experience real-life scenarios. For example, during the user orientation programme, instead of watching a lengthy presentation about the library, users can take a virtual tour of the library facilities, meet other users in a shared virtual space, and have a real-life experience of the library where the library staff can better present and demonstrate library resources and services to users (Nijland, n.d.).

• **Virtual Exhibitions-** Libraries host educational and awareness exhibitions that reflect the intellectual quality of their collections and promote library resources. Metaverse is a great place to organise such exhibitions that provide a more immersive and engaging experience for library users. More and more artists are using digital platforms such as Roblox, Decentraland, Sandbox or the Metaverse to showcase their latest digital art (Sayej, 2022). - Virtual learning spaces - Before and after COVID-19, learning has shifted from physical classrooms to virtual and blended spaces. With the help of the metaverse, it is possible to enter the virtual campus and library to learn, explore, and socialise (Jagannathan, n.d.). Libraries can provide virtual spaces in the metaverse for students to collaborate, brainstorm, and discuss group assignments.

• **Organizing Library Conferences and Events** - For years, people have been using video conferencing and live streaming to hold virtual conferences and events, which have grown considerably in importance in recent years. The metaverse has the potential to provide a highly immersive and interactive experience where LIS-based conferences and events can organise the metaverse and people can move freely from session to session or booth to booth, which is impossible with existing digital platforms (Chodor, 2022). Even after the event is over, holding a conference virtually saves a lot of travel costs and provides more opportunities for people around the world to participate in the conference online.

• **LIS Education and Training** - During the Covid period, educational institutions were completely closed and students received education in the form of video conferencing and online courses. Metaverse can change access to education and the way knowledge is delivered. Metaverse can reshape education, making it more exciting and meaningful by practically illustrating complex theoretical concepts (Iyengar, 2022). In online education, the objects are touched or felt, but with AR/VR visualisations, one can recreate the physical environment or objects in 3D visualisations, making LIS education and training more interactive and engaging and enhancing the overall learning experience. Metaverse can also be used for virtual training experiences. When explaining a concept, they can provide 3D models to reinforce the emphasis and help them hone their skills and develop a better understanding before going into the real world (Neeti, 2022). It can enhance the learning experience through simulations and

provide hands-on experience with various topics and concepts. The major advantage of a metaverse in education and training is the complete immersion of students in the digital classroom where students can interact with their teachers and participate more effectively in daily activities such as lessons, workshops, projects and seminars (Ravi, 2022). Khon Kaen University Library, for example, has introduced a state-of-the-art learning resource that uses VR headsets to enhance learning and impart new knowledge to students and the public through Metaverse experiences. Public libraries can also use the metaverse to provide information services to the community in a form that meets the needs of different communities.

- **Research** – One of the possible applications of the metaverse in research is the collection of data from a sample population. LIS researchers in universities and organisations can use metaverse technology for data collection. Traditional research methods such as surveys, focus groups and questionnaires can produce biased results. By using immersive technologies such as eye-tracking VR in combination with biometric devices, researchers can capture involuntary muscle movements such as emotions, heart rate, gaze and other key performance metrics (Nijland, n.d.).

- **Improve accessibility for people with differently-abled-** People with disabilities often find it difficult to access content in different multimedia formats. According to a report by Book Trust, only 7% of books are accessible in visually impaired formats, and only 2% are available in Braille. 3D audio e-location, audio descriptive menus and haptic feedback tools can potentially mitigate these barriers (Arti, 2022). Libraries could be more accessible for people with physical disabilities in the metaverse, where a person can experience a virtual library tour. AR apps such as TapTapSee allow users to point their phones at any object to better describe it and trigger a movement to improve accessibility in the metaverse.

CHALLENGES AND ISSUES OF THE METAVERSE

- **Privacy and Security-**

Privacy and security are the main areas of concern in the metaverse. Weak security measures lead to an escalation of cyber-attacks, theft and fraud. Proper regulations and policies are needed to mitigate this risk (Wasnik & Bhasin, 2022). Developers and technology companies should also be concerned with the security of the data so that this technology can be widely deployed (Ameen, 2022). For example, the metaverse could pose a major threat to a person's identification in a virtual environment that anyone can replicate. It is crucial to protect a person's identity and neither a bot nor anyone else can forge it (Aziz, 2022).

- **Cost of Technology-**

The metaverse requires high-tech hardware such as goggles, gloves, sensors and other wearable devices that are very expensive and not everyone can afford it. The cost factor limits the reach of this technology, leads to more inequality and a digital divide in society (Ameen, 2022).

- **Data-related Threats-**

The data generated or produced by wearable devices and users/avatars can be exposed to high risks in the metaverse in terms of data manipulation, the injection of false data and intellectual property infringement. The issue of intellectual property rights has also been highlighted by the use of celebrity lookalikes in video games (Wang et al., 2022).

• Authentication of Avatar-

In the virtual world, this is a serious problem, more so than in the physical world. The metaverse can be more challenging due to verification of facial features, voice, and video recordings, and can be mitigated by creating multiple AI bots (i.e., digital humans) that appear, hear, and behave identically to the user's real avatar in the virtual world (Wang et al., 2022).

CONCLUSION

Libraries have been reengineering and rebuilding their role and function in the contemporary digital information society in response to the ongoing advancements in technological development. The metaverse is still in its infancy and has not yet reached its full potential. This new technology will have benefits as well as drawbacks. How this technological disruption will affect various industries, society, and libraries is still up in the air. The metaverse, which is sometimes referred to as the next generation of the internet, is being closely watched by the globe for its potential to transform society and the way that the actual and virtual worlds are merging. The power of the metaverse is being investigated by many industries, and they are taking distinct approaches to it. It is highly likely that shortly, the use of the metaverse will exacerbate current challenges in the information industry (Pack, 2022). But libraries might also take advantage of the metaverse's advantages to provide more immersive digital user experiences and more individualized services. The world will soon witness a plethora of metaverse applications that have the potential to completely transform how we work, collaborate, and interact with one another.

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