New Developments in Faculty Roles for Information Literacy Education in Academic Libraries from the Metaverse Perspective

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Date: 2023-08-28T00:00:00+00:00

Abstract

Purpose/Significance This paper aims to investigate the new developments in teacher roles for information literacy education in university libraries within the metaverse context, and to introduce relevant practical cases.

Method/Process Based on a literature review of the necessity of information literacy education in metaverse environments, this study raises the issue of required transformation of teacher roles for information literacy education, addressing it from three dimensions: the rationale for transformation, the specific aspects to be transformed, and the approaches to transformation. Practical cases are subsequently employed to demonstrate the feasibility and necessity of such transformation.

Results/Conclusion Within the metaverse context, teacher roles have undergone significant transformation, evolving from traditional providers of information resources and knowledge to builders, guides, and motivators of metaverse environments. Concurrently, teachers must also cultivate innovative capabilities, communication skills, and critical thinking abilities to meet the challenges of metaverse education.

Innovation/Novelty This paper constitutes the first exploration of new developments in teacher roles for information literacy education in university libraries from the metaverse perspective, and validates through practical cases the effectiveness of metaverse technology applications in information literacy education.

Full Text

New Developments in the Teacher's Role in Information Literacy Education in University Libraries from the Perspective of the Metaverse

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Abstract

[**Purpose/Meaning**] This article aims to explore the new developments in the teacher's role in information literacy education within university libraries from the perspective of the metaverse, and to introduce relevant practical cases. [**Methods/Process**] Based on a literature review of the necessity of information literacy education in metaverse environments, the paper proposes the issue of required transformation in the role of information literacy teachers. This question is addressed from three dimensions: why transformation is needed, what aspects should transform, and how to achieve transformation. Finally, practical cases are used to illustrate the feasibility and necessity of these changes. [**Results/Conclusion**] In the metaverse perspective, the teacher's role has undergone significant transformation, shifting from traditional providers of information resources and knowledge to builders, guides, and motivators of metaverse environments. Simultaneously, teachers must possess innovative capabilities, communication skills, and critical thinking abilities to meet the challenges of metaverse education. [**Innovation**] This article is the first to explore the new developments in the teacher's role in university library information literacy education from the metaverse perspective, and verifies the application effects of metaverse technology in information literacy education through practical cases.

Keywords: Metaverse, University Libraries, Information Literacy Education, Teacher Role, Practice Case

Classification Number: G251

With the development of metaverse technology, information literacy education in university libraries faces both new challenges and opportunities. The metaverse is a virtual reality environment characterized by high interactivity and immersion, which can provide students with richer and more diverse learning resources and practical experiences. From the metaverse perspective, the teacher's role has transformed, requiring educators to adapt to new educational environments and demands, enhance their own capabilities and qualities, and fulfill new functions. This article aims to explore these new developments in the teacher's role for information literacy education in university libraries and introduce relevant practical cases.

1. Metaverse and Information Literacy Education in University Libraries

1.1 Library Perspective on Metaverse Cognition

The term "metaverse" originated from the concepts of "Metaverse" and "Avatar" mentioned in the 1992 foreign science fiction work *Snow Crash*, where people could own their own virtual avatars in the "Metaverse" [1]. However, there is currently no unified definition in academia or industry. In the library field, Professor Ma Feicheng of Wuhan University points out that library and information science shares consensus with the metaverse's purpose and philosophy in three aspects: first, consensus on the cognition of data elements; second, consensus on the exploration of intelligence and wisdom; and third, consensus on the pursuit of knowledge services and user experience [2]. Researcher Liu Wei, Deputy Director of Shanghai Library, considers the metaverse as an application form built upon the foundation of Web 3.0, which constructs imaginative spaces through media such as AR and VR to achieve virtual spatiotemporal effects, and uses blockchain technology as a platform to realize data 确权 (rights confirmation) and assetization functions [3].

The *Regulations on Libraries in Regular Institutions of Higher Education* issued by the Ministry of Education in 2015 clearly stipulates that the main functions of libraries are educational functions and information service functions [4]. As the knowledge center and base for information literacy education in universities, university libraries hold a pivotal position. The 20th Party Congress report made important deployments for the prosperity and development of cultural undertakings and industries, proposing the "implementation of the national cultural digitization strategy" [5]. Libraries should actively respond to national strategies, promote digital transformation, attach importance to information literacy education, and make positive contributions to the development of cultural undertakings. In November 2022, Professor Shen Yang's team at the Metaverse Culture Laboratory of Tsinghua University's School of Journalism released the *Metaverse Development Research Report 3.0*, which depicts the relationship between the metaverse and library science from three aspects: culture, information, and education, proposing to build a library universe ecology—one component of which is an educational ecology formed by constructing virtual educational interaction scenarios and creating new models of information literacy education [6].

The above demonstrates that under the metaverse background, the necessity of information literacy education in university libraries has become increasingly prominent. The application of this emerging technology in the education field provides new platforms and opportunities for information literacy education in university libraries, while also placing higher demands on educators and teachers.

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2. Transformation of the Teacher's Role in University Library Information Literacy Education under the Metaverse Perspective

To adapt to the transformation brought by the metaverse to the education sector, the role of teachers in university library information literacy education also needs to undergo corresponding changes. First, it is necessary to clarify the purpose and causes of this transformation.

2.1 Why Transform?

Under the metaverse background, the transformation of the teacher's role in university library information literacy education is first determined by the characteristics of the metaverse environment itself. The metaverse is a virtual, immersive cyberspace featuring cross-spatiotemporal, cross-regional, highly free, and decentralized characteristics. This environment poses new challenges to information literacy education, requiring teachers to re-examine their roles and teaching methods. Second, the objectives of information literacy education have changed. From the metaverse perspective, the goal of university library information literacy education is not only to cultivate students' skills in information retrieval and utilization, but more importantly, to develop their information awareness, information ethics, information creation, and information critical thinking abilities to adapt to the information society in the metaverse environment. Third, there is a need for innovation in educational teaching methods. In the metaverse perspective, university library information literacy education needs to employ new educational teaching methods and technologies, such as virtual reality, augmented reality, and artificial intelligence, to improve educational effectiveness. Teachers need to master these new technologies and apply them in teaching practice. In summary, the transformation of the teacher's role in university library information literacy education under the metaverse perspective is necessary, as it helps improve education quality, better fulfill teachers' roles in information literacy education, and cultivate students' ability to adapt to the information society in the metaverse environment.

2.2 What Aspects to Transform?

Through the aforementioned analysis, the necessity of role transformation for information literacy teachers in university libraries becomes clear, providing a foundation for exploring the direction of transformation.

(1) From Information Resource Provider to Metaverse Environment Builder

In traditional educational environments, library information literacy teachers need to provide rich and diverse information resources for university faculty and students, including books, journals, newspapers, electronic resources, etc., to meet their needs in teaching, research, and academic exchange. However,

in the metaverse environment, teachers must not only provide information resources but also be adept at utilizing relevant metaverse technologies such as artificial intelligence, virtual reality, augmented reality, blockchain, and other "frontier technologies," while integrating explicit knowledge (documents) and tacit knowledge (wisdom) [7] to build a metaverse environment suitable for information literacy education. As Researcher Liu Wei stated, we must not only build libraries in the metaverse and extend library services to the metaverse, but also incorporate accumulated and ongoing knowledge into the domain of the metaverse [8].

(2) From Traditional Knowledge Transmitter to Guide and Motivator

In traditional educational environments, university library information literacy teachers primarily played the role of knowledge transmitters, responsible for developing teaching plans, selecting teaching content and methods, and imparting this content to students. This educational approach emphasized the teacher's dominant position, while students remained in a passive receiving state. In the metaverse perspective, the teacher's role in university library information literacy education will place greater emphasis on guidance and assistance. In the metaverse, teachers can use technical means such as virtual reality and augmented reality to provide students with more authentic and rich learning environments. Teachers can stimulate students' interest and motivation by setting tasks and guiding them in exploration and practice. Simultaneously, teachers can provide personalized guidance and suggestions based on students' learning situations to help improve their information literacy. As is well known, AI tools play an important role in the metaverse, providing more innovation and possibilities. For instance, the quality of content generated by the well-known ChatGPT is highly correlated with the accuracy of prompts. Many students, without guidance, only provide very simple descriptions, making training on AI tools particularly important. This requires information retrieval teachers to demonstrate basic knowledge of prompt engineering to students—a completely different approach from previously teaching search engine techniques in information retrieval classes.

(3) From Informatization Construction Participant to Information Literacy Education Innovator

In traditional educational environments, library information literacy teachers need to participate in university informatization construction, working closely with teaching, research, and management departments to promote library informatization development and provide better information services for faculty and students. In the metaverse environment, methods of information acquisition and dissemination have undergone transformation. Traditional informatization construction mainly focused on hardware facilities and network environments, whereas in the metaverse, information dissemination is more diverse, personalized, and immersive. Teachers need to continuously innovate educational methods, integrating metaverse characteristics into information literacy education to improve students' abilities in information acquisition, analysis, and application.

For example, in traditional information literacy education, teachers mainly focused on how to use computers and network resources for information retrieval and processing. In the metaverse environment, teachers can bring students into a virtual library, allowing them to more intuitively understand and master information retrieval through immersive experiences. In this process, teachers need to guide students on how to acquire, analyze, and apply information in these virtual environments, thereby enhancing students' information literacy.

(4) From Physical Person to Digital-Intelligent Person

Digital-intelligent persons are the most indispensable infrastructure in metaverse spaces. The concept of digital-intelligent persons was first proposed by Academician Qian Xuhong of the Chinese Academy of Engineering and Zhao Xing's team. Originally defined in the metaverse as a new type of human evolved with data intelligence capabilities and means, it has now developed into a "digital-intelligent person" framework system of "multi-source data + intelligent algorithms + domain experts," representing the ultimate form of evolution for virtual humans and digital humans [9].

In metaverse environment teaching, teachers can conduct education and instruction in the form of digital-intelligent persons using technologies such as virtual reality (VR) and augmented reality (AR). For example, teachers can create a library with three-dimensional effects in the metaverse, allowing students to enter as virtual avatars and engage in information literacy education learning through interaction with virtual teacher roles. Virtual teachers can also automatically generate courses based on teaching plans and content, and deliver lectures to students. Simultaneously, virtual teacher roles can assess and provide feedback on student learning through intelligent algorithms, helping students better understand learning content and improve learning efficiency.

Additionally, using digital-intelligent persons can reduce education and teaching costs. First, virtual teacher roles can be automatically generated and reused, avoiding cost increases caused by teacher turnover. Second, using digital-intelligent persons for education and teaching can break the limitations of time and space, improving the utilization efficiency of educational resources. This means that regardless of where students are located, they can receive education anytime and anywhere, and educational resources can be utilized more flexibly. For example, new student library orientation in traditional teaching environments often suffers from insufficient teaching staff, superficial formalities, and lack of interaction. In the metaverse, a virtual library environment can be created, allowing new students to enter as virtual avatars and engage in information literacy education learning through interaction with virtual teacher roles. Another example is Shanghai Library East's launch of China's first virtual reading promotion ambassador, Luo Tianyi [7], which represents a beneficial attempt to apply virtual human technology to information literacy education. Luo Tianyi is a virtual singer who can interact with readers through songs and dances, guiding them into the library and helping them understand library resources and services.

In summary, under the metaverse background, the role transformation of teachers in university library information literacy education is both necessary and important. Teachers need to adapt to new teaching environments and demands, leverage the advantages of digital-intelligent persons, and become guides and interdisciplinary educators for student learning. By mastering metaverse-related technologies and tools and adopting flexible and diverse teaching methods, teachers can better meet students' personalized learning needs and improve their information literacy and application abilities.

2.3 How to Transform?

Next, this article focuses on methods and strategies for cultivating the abilities of university library information literacy education teachers to achieve the aforementioned transformations.

(1) Technical Skills Training: Universities can organize teachers to participate in training courses on metaverse technologies, introducing how to use metaverse platforms and virtual reality equipment. For example, teachers can learn how to create and manage virtual libraries in the metaverse, how to interact and collaborate with students in the metaverse, and how to use virtual reality equipment for immersive teaching. Teachers can also utilize the interactivity and programmability of the metaverse to design more attractive and practical information literacy education content. For instance, teachers can create a literature retrieval scenario in virtual reality, allowing students to practice literature retrieval skills in this scenario and use tools and resources in the metaverse to solve retrieval problems.

(2) Innovation Ability Cultivation: Universities can provide innovation training, organizing teachers to participate in academic conferences and seminars on metaverse education to cultivate their innovative abilities. For example, teachers can learn how to utilize the interactivity and programmability of the metaverse to develop new educational applications and tools to meet students' different needs, and continuously update their teaching content and methods.

(3) Communication Ability Enhancement: In the metaverse context, enhancing teachers' communication abilities is an important goal. Universities can provide professional communication skills training and help teachers adapt to and improve their communication abilities in metaverse environments through simulated teaching scenarios. For example, teachers can conduct teaching simulations in virtual reality, practicing how to use voice communication, body language, and facial expressions in virtual reality equipment to effectively communicate and interact with students. Additionally, as digital-intelligent persons and virtual humans become increasingly important, teachers need to master skills for communicating and interacting with these virtual entities. Digital-intelligent persons and virtual humans possess high intelligence and interactivity, capable of simulating human thinking and behavior patterns. Therefore, teachers need to understand and adapt to these characteristics to better communicate with

these virtual entities, thereby providing more personalized and precise teaching services. Overall, providing professional communication skills training and simulated teaching scenarios can help teachers enhance their communication abilities in metaverse environments, better adapt to the roles of digital-intelligent persons and virtual humans in education, and provide higher quality information literacy education services.

(4) Critical Thinking Enhancement: Critical thinking refers to the careful consideration, analysis, and evaluation of received information to better understand and solve problems. In the metaverse, information sources are extremely diverse, including various media, social platforms, virtual worlds, etc., and information quality varies significantly. Therefore, teachers need to possess critical thinking skills to guide students in correctly understanding information and solving problems. AI tools like ChatGPT and DALL-E will make information literacy and digital literacy more important than ever. Christopher Cox, Dean of Libraries at Clemson University, believes that librarians can help teachers instruct students in critical thinking skills to verify facts and evaluate the quality of answers provided by ChatGPT [10].

(5) Professional Ethics Expansion: Teachers' professional ethics also need updating and development in metaverse education. In the metaverse, teachers must not only focus on traditional teaching ethics and norms but also pay attention to educational ethics issues in the virtual world, such as VR potentially being abused for manipulation, privacy concerns, and possible negative health impacts [11]. These require information literacy education teachers to pay greater attention to protecting students' privacy and personal information, respecting student diversity and differences, and creating safe, open, and equal learning environments. Furthermore, metaverse-based information literacy education can apply emerging technologies to education. If teachers lack good professional ethics, they may abuse technological means, such as exploiting students' curiosity and desire to explore for fraudulent or deceptive unethical behaviors. Therefore, in the metaverse, information literacy education teachers should possess not only professional knowledge and teaching skills but also high professional ethics standards.

In conclusion, under the metaverse environment, the cultivation of teachers' abilities in university library information literacy education requires a multifaceted approach through various channels and methods. Only when teachers' abilities are comprehensively enhanced can they better adapt to the new educational environment and provide better information literacy education services for students.

4. Practices in University Library Information Literacy Education under the Metaverse Perspective

(1) Practice Case: Building a Metaverse Library

On April 27, 2022, the University of Macau officially launched its 360-

degree panoramic virtual technology-guided library tour. Readers can visit https://vr.library.um.edu.mo/ to tour the library from multiple angles without time or location constraints, including the library's exterior architecture, internal stacks, reading spaces, lecture halls, exhibition halls, and ancient books library [12]. This case demonstrates the new development of teachers' roles in information literacy education, requiring teachers to possess updated technologies and teaching methods and to design and develop educational resources to adapt to new educational environments and demands.

(2) Practice Case: Developing Metaverse Learning Environments and Services

The Marriott Library at the University of Utah uses the Engage platform to provide virtual reference services in VR environments. The virtual consultation desk allows users to interact with librarians in a 3D environment and receive personalized help [13]. The University of Oklahoma Libraries used the Engage platform to develop a VR experience called "Find Your Way to the Library." This experience guides users through a virtual campus and into the library, providing an interactive and immersive way to learn about library services and resources [13]. These two cases demonstrate the transformation of teachers' roles in information literacy education, requiring teachers to possess new technical abilities and interdisciplinary knowledge to become guides, assistants, and learning partners for students' information acquisition.

(3) Practice Case: Conducting Metaverse Academic Activities

On December 3, 2022, Shanghai International Studies University held the first "Metaverse Conference Room" in the metaverse scene among domestic university libraries [7]. The conference featured two major highlights: first, high-fidelity restoration and complete experience, breaking the barriers between reality and virtual dimensions. The scene setting included not only conference rooms, training rooms, and VIP lounges for sub-venue reports, but also interactive check-in areas, photo zones, experience rooms, and exhibition halls. The second highlight was the diverse identities of the participating "digital humans," including both industry technology experts and newcomers, all gathering together as their self-defined "digital human" avatars for immersive experiences [14]. In this case, teachers can provide students with new learning methods and resources by designing and developing metaverse conference rooms, breaking traditional educational models and boundaries. Teachers need to possess innovative thinking and capabilities to design and develop such new educational resources and teaching methods to meet students' learning needs and improve their information literacy.

These examples demonstrate the potential of libraries using the metaverse to interact with readers in new and innovative ways, reflecting the new roles of teachers and new developments in capabilities for information literacy education under the metaverse perspective.

The development of metaverse technology has brought revolutionary changes

to information literacy education in university libraries. From the metaverse perspective, the teacher's role has undergone significant transformation, shifting from being merely a provider of information resources and knowledge to becoming a builder, guide, and motivator of metaverse environments. Simultaneously, teachers must possess innovative capabilities, communication skills, and critical thinking abilities to address the challenges of metaverse education. Through practical cases, this article demonstrates the application of metaverse technology in university library information literacy education, aiming to improve students' information literacy capabilities and learning outcomes. Future research can further explore how to better leverage these new developments in the teacher's role to promote the advancement of information literacy education.

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Note: Figure translations are in progress. See original paper for figures.