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Conceptualizing Extended Reality Metaverse-based Pedagogy Model: A Hospitality and Tourism Education Perspective

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Abstract: The prevalence of online learning has significantly increased, particularly in light of the COVID-19 pandemic. Nevertheless, the shift to online education has presented numerous obstacles and concerns. The correlation between a lack of enthusiasm towards online learning and subpar academic achievements suggests the necessity to tackle the issues that impact students' involvement. Educators need to address obstacles encountered by students in online learning, including diminished concentration and inadequate learning delivery. Metaverse technologies, which have attracted growing interest among academia and practitioners, can be the answer to mitigate issues related to online education. Although metaverse technologies show promise for online education, there is a lack of research on their suitability for hospitality education. Comprehending how metaverse technologies can be seamlessly incorporated into online hospitality educational environments is crucial for the progression of such technology. Therefore, this study aims to conceptualize an extended reality metaverse-based pedagogy model for online hospitality education. The conceptual paper is a great resource for stakeholders who are interested in investigating the possibilities of metaverse technologies for hospitality education. This work also establishes a basis for future research that investigates the application of metaverse technologies in online educational environments.

Keywords: *Metaverse, pedagogy model, extended reality, online teaching, hospitality and tourism*

1. Introduction

Online teaching has become increasingly prevalent, especially during the COVID-19 pandemic. With technological advancement, the education system has shifted from traditional classroom to online course delivery (Murray & Pérez, 2015). However, this transition to online education has brought about various challenges and issues. These challenges include obstacles that affect students' engagement and interest in the online learning process (Okyere et al., 2022). Educators have identified various challenges faced by students in online learning, such as decreased focus and unsatisfactory learning platforms (Yusuf, 2020). Students' lack of participation in online classes has also been attributed to factors such as low motivation, ineffective teaching design, and imperfect online education platforms (Agustina, 2022; Hong et al., 2021). Furthermore, the lack of interest in online learning was found to lower learning outcomes, indicating a need to address factors influencing students' engagement (Suhairi et al., 2023). These challenges can be mitigated by a metaverse-based teaching pedagogy (Rahman et al., 2023).

Metaverse is a technology that allows users to interact and engage with each other in virtual environments (Buhalis et al., 2022). Its potential for advancing online education has garnered increasing interest among academics and scholars. Generally, metaverse in education has focused on educational design that can be tailored for learners of different generations using artificial intelligence technologies (Tlili et al., 2022). This suggests the effectiveness of metaverse technologies in accommodating learners of diverse age groups. Metaverse is a new social communication platform that can radically transform conventional forms of social participation in education (Kye et al., 2021). More importantly, metaverse technologies enable a fair learning environment that is not tied to time and space (Park & Kim, 2022a). These suggest that metaverse technologies have the potential to enhance students' online learning experience, acceptance of technology, and motivation toward learning. Recently, the possibility of the metaverse to advance the learning process into a more versatile, interactive, and interesting experience has been empirically proven by Rahman et al. (2023).

Despite the promising potential of metaverse technologies for online education, limited studies have explored the viability of metaverse technologies for hospitality education. Hwang and Chien (2021) attributed this to the lack of exposure to the potential of the metaverse. Although the use of metaverse in tourism and hospitality management has been explored (Buhalis et al., 2022), a robust framework that implements metaverse technologies in hospitality education has not been conceptualized. Research in this area could investigate how metaverse applications can enhance experiential learning (Buhalis et al., 2022; Wei, 2023). But how do metaverse technologies empower education pedagogy? An understanding of how metaverse technologies can be integrated into hospitality educational settings is essential for advancing the field of metaverse-based education.

To provide an understanding of a metaverse-based pedagogy model for hospitality and tourism education, this study conceptualized a framework that integrates metaverse technologies into online hospitality education. To answer the research question, this study synthesizes previous literature to present critical components of the metaverse-based pedagogy framework, particularly on its application to hospitality online education. The study also recommends strategies for metaverse technologies implementation in online hospitality education. The study should serve as a valuable resource for educators, researchers, and practitioners interested in exploring the potential of metaverse technologies for enhancing online hospitality and tourism education. Through the conceptualization of the extended reality pedagogy framework, the study provides a foundation for future research aimed at maximizing the use of metaverse technologies in online hospitality and tourism educational settings.

2. Literature Review

Online Learning and Metaverse Technologies

Online learning refers to the provision of education through the use of the Internet and other electronic gadgets (Wallace, 2003). It has seen a significant increase in popularity, particularly during the COVID-19 pandemic, which expedited its adoption as a primary mode of education (Okyere et al., 2022). Online learning provides flexibility, accessibility, and convenience for both students and educators, enabling learning to occur at any time and from any location. However, online learning in higher education also presents challenges that can impact student experiences, interests, and engagement. Issues such as lack of personal interaction and feelings of isolation can lead to poor student experiences in online classes (Suhairi et al., 2023; Wallace, 2003). The absence of face-to-face interactions and a physical classroom environment may also decrease student engagement and motivation, ultimately affecting learning outcomes (Hafeez et al., 2022). Here, online learning presents a main challenge in maintaining student interest and willingness to stay engaged in virtual environments. This issue may be resolved by metaverse technologies.

Metaverse is characterized by immersivity and interactivity (Buhalis et al., 2022). As metaverse technologies allow for a highly interactive learning environment, the potential of metaverse technologies for improving online education has attracted scholars' attention. For example, Buhalis et al. (2022) highlighted that the metaverse is a mixture of reality and virtual environments that provide users with a platform for social engagement and interaction. Characterized by its spatial, immersive, shared, and real-time nature, the metaverse provides users with extended digital selves and virtual experiences (Hadi et al., 2023; Weinberger, 2022). Metaverse is envisioned as a futuristic digital frontier that integrates various technologies (i.e., virtual reality, augmented reality, social media) to create a seamless and interconnected virtual environment (Hadi et al., 2023; Weinberger, 2022). It serves as a platform where users can explore, interact, and collaborate in virtual spaces, blurring the boundaries between physical and digital realms. The metaverse is defined by its ability to offer users a unique and immersive experience that transcends traditional online interactions (Weinberger, 2022; Suh & Ahn, 2022).

In the context of higher learning education, the metaverse offers a chance to open completely new approaches to online learning environments for students and teachers (Onu et al, 2024). With metaverse technologies, educational institutions can build effective and meaningful learning environments that increase students' interest, interaction, and learning outcomes (Akour et al., 2022; Singla et al., 2023). Metaverse holds significant potential for creating a constructivist learning environment for learners, where they can interact with virtual avatars and flexible learning settings (Singla et al., 2023). Nevertheless, like any other significant educational

innovation such as augmented reality (Ahmad Ridzuan et al., 2020), the metaverse also has its challenges. These challenges need to be systematically addressed to ensure efficient utilization of metaverse across various learning areas of hospitality education. The benefits and challenges of integrating metaverse technologies into hospitality educational settings are discussed in the following section.

Potential Metaverse Applications, Benefits, and Challenges in Hospitality Online Education

Metaverse technologies present both benefits and challenges to online education. Jagatheesaperumal et al. (2022) who investigated the uses, difficulties, and unresolved challenges of extended reality and Internet of Things-enabled metaverses have provided a guide for integrated advanced technologies that enhance students' experience and learning outcomes. Zhang et al. (2022) discussed possible uses of metaverse in education, including blended learning, language learning, competence-based education, and inclusive education. In their view, these metaverse technology applications can be adapted to hospitality education to create dynamic and engaging learning environments. These scholars suggest that the metaverse offers exciting opportunities for hospitality education, including immersive simulations, virtual customer interactions, and experiential learning environments.

The potential benefits of metaverse applications in transforming hospitality students' learning experiences are evident in various studies. For instance, Park and Kim (2022a) examined how the metaverse impacts customer experience and value co-creation in the field of hospitality and tourism management. They suggest that integrating metaverse technologies into hospitality education can help educators enhance student engagement, and learning outcomes, and develop practical skills. Here, it indicates that hospitality education that integrates metaverse may provide students with immersive experiences that imitate real-world hospitality interactions. This could improve students' comprehension of customer service and engagement. As such, a metaverse-based teaching pedagogy is beneficial for practical-based courses such as front office, housekeeping, food and beverage service and culinary (Patiar et al., 2021).

Kye et al. (2021) provided an overview of current trends and future research directions for the metaverse in the hospitality and tourism industry. They suggest that integrating metaverse technologies into hospitality education allows students to acquire hands-on experience in hotel operations, event planning, and guest services, equipping them for a seamless transition into the hospitality industry. Tlili et al. (2022) explored the potential applications of a metaverse in education, including blended learning and competency-based education. Lee and Jo (2023) found the potential of metaverse-based collaboration activities in developing students' personality traits and skills by exploring the application of metaverse in problem-based learning curricula from hospitality students' perspectives. Similarly, Horng and Hsu (2024) also demonstrated an enhanced comprehension of hospitality knowledge and skills through an evaluation of AR and VR's impact on learning outcomes.

Although metaverse technologies are advantageous for hospitality education, the challenges and potential issues of their applications require thorough consideration. Several scholars shed light on these challenges and raise questions associated with the integration of metaverse in educational settings. Park and Kim (2022b) for example, highlight the limitations and challenges (e.g., social influences, constraints regarding educational value deviations, awareness of Metaverse usage) of implementing immersive metaverse This urges for more research on challenges that can impact the effectiveness and usability of metaverse in online education. Akyürek et al. (2024) argue that metaverse often requires a high-speed internet connection and costs more compared to traditional learning tools. Tlili et al. (2022) identify a research gap in lifelogging applications in the educational metaverse, highlighting potential challenges in leveraging metaverse technologies for educational purposes.

Ajani (2023) discusses challenges such as privacy concerns, digital literacy gaps, and the importance of inclusivity in metaverse applications. The author views these challenges can pose obstacles to the widespread adoption and effective use of the metaverse in online education. Zheng et al. (2023) point out problems with online education in the metaverse, such as the risk of distractions, eye strain, and delays in question-and-answer sessions. They found these challenges can impact student engagement and learning outcomes in virtual learning environments. Li and Yu (2023) address potential challenges that may hinder sustaining metaverse-based blended English learning, emphasizing the importance of overcoming obstacles to ensure the success of

metaverse applications in educational contexts. If integrating metaverse into education is beneficial, how to overcome these challenges? To answer the question, it is therefore important to develop a robust framework on how to integrate extended reality technology such as Metaverse into online hospitality education. The proposed conceptual framework is detailed in the next section.

3. Extended Reality Empowered Educational Pedagogy Framework

As educators and institutions strive to integrate metaverse extended-reality technologies into the curriculum, it is essential to understand its critical components. Generally, there are six components entailing technology infrastructure (Coyne et al., 2021; Huang & Roscoe, 2021), technology familiarization (Kluge et al., 2022), instructional design (Khlaif et al., 2024), content development (Meccawy, 2023), assessment and evaluation (Gandolfi et al., 2020), and continuous improvement (Geisen & Klatt, 2022). Each component plays a distinctive role in the successful integration of metaverse extended-reality technologies in educational settings. Understanding the importance of these components will help educators and institutions produce a comprehensive and efficient online learning pedagogy.

The framework relies heavily on an established technology infrastructure to ensure the smooth functioning of immersive experiences. This encompasses high-performance computing resources, reliable networking, and readily accessible platforms (Al-Adwan et al., 2023; Akyürek et al., 2024). An efficient infrastructure is crucial for content delivery and seamless real-time interaction among all learners. It comprises servers, networking equipment, headsets, other devices, and platforms facilitating metaverse extended-reality technology experiences. Contrary to traditional educational settings that use simple computer laboratories or online learning platforms, metaverse extended-reality technologies require a more complex and resource-demanding infrastructure. Smooth and immersive experiences necessitate the use of more resilient and high-performing technology. The significance of a solid technical infrastructure for successful metaverse extended-reality technologies implementation is emphasized by Coyne et al. (2021) who highlighted the importance of dependable and high-performing computing resources. Huang and Roscoe (2021) provide additional insight into the issue by examining the specific requirements of head-mounted displays in engineering education. They highlight the need for hardware that can handle detailed and complex visual representations.

Secondly, educators and students should gradually introduce the technology through different platforms. A recent study by Kluge et al. (2022) found several obstacles to adopting metaverse extended-reality technologies. One of the key issues is the insufficient proficiency among educators, which hinders the effective implementation of these technologies. To tackle these problems, it is important to provide comprehensive training and assistance to educators as it enables them to acquire essential skills required to utilize metaverse extended-reality technologies (Kluge et al., 2022). Familiarisation efforts often involve training sessions, workshops, and continuous support mechanisms that improve learners' confidence and expertise. Traditional instructional technologies might require less familiarisation since they are typically more intuitive or are familiar to learners. As the use of metaverse extended-reality technologies technology grows more prevalent, it is essential to ensure that both educators and learners are familiar and at ease with these tools (Al-Adwan et al., 2023; Akyürek et al., 2024).

The third component is instructional design. Traditional education typically emphasizes instructional design that centers around textual materials, videos, and conventional interactive components. Metaverse extended-reality-enabled instructional design is a more complex procedure that entails the creation of three-dimensional models, virtual environments, and interactive simulations. This entails developing learning experiences that capitalize on the distinct capabilities of metaverse extended-reality technologies and align with the intended learning objectives (Al-Adwan et al., 2023). This encompasses interactive and immersive instructional strategies, simulations, and activities that foster engagement and enhance understanding (Onu et al., 2024). Khlaif et al. (2024) address the transition in instructional design towards more utilization of interactive and immersive content. This highlights the importance of engaging students with content that goes beyond conventional approaches while still in line with the learning objectives.

Fourth is content development, which involves the creation of educational materials that can be delivered using metaverse extended-reality platforms. This encompasses 3D models, virtual tours, augmented reality overlays,

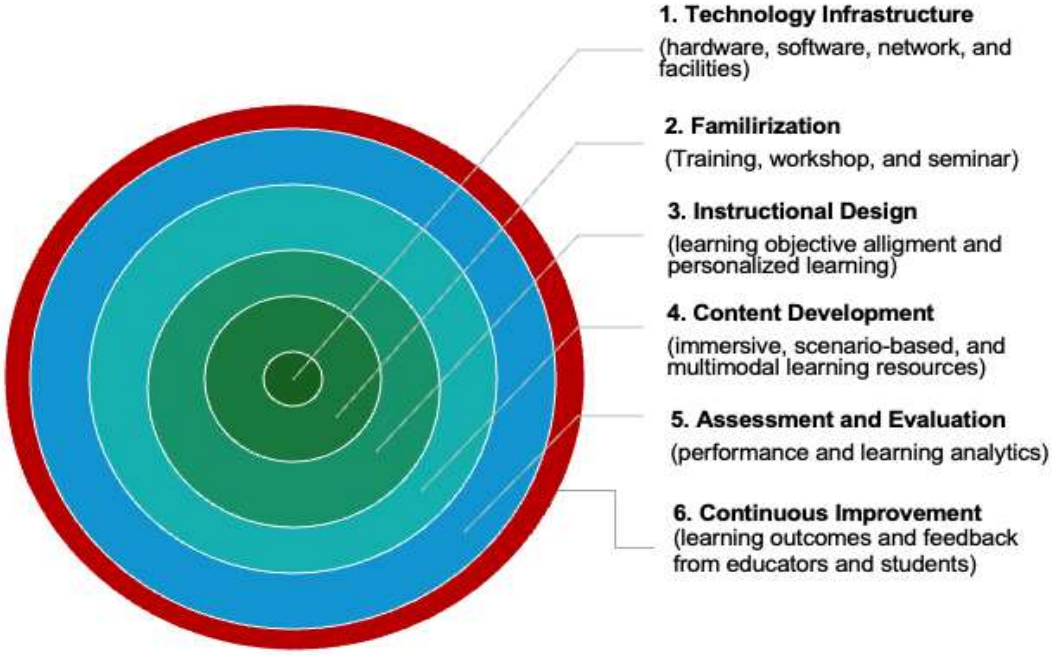
and various other forms of immersive multimedia content. Traditional content development often entails the creation of textbooks, worksheets, and standard multimedia content. Developing the content necessitates an entirely different set of skills, encompassing 3D modelling, animation, and programming for interactive components. When creating metaverse extended-reality content, it is important to prioritize the learner experience by making sure it is easy to use, interesting and can be accessed by a wide range of learners (Al-Adwan et al., 2023). Meccawy's (2023) study indicates that involving learner-centered design in metaverse extended-reality apps significantly impacts learning efficacy. This makes it a crucial aspect in content development towards meeting learners' requirements.

To assure the efficacy of metaverse learning experiences, the fifth component incorporates developing and implementing techniques to assess and evaluate learners' progress. The assessments comprise both formative and summative evaluations. Metaverse extended-reality assessments should offer more interactivity and engagement than traditional assessments (Griffin, 2021). Employing simulations and real-time feedback offered a more thorough evaluation of learner understanding and skills (Geisen & Klatt, 2022). Furthermore, the assessment and evaluation process must establish clear performance criteria, utilize learning analytics, and quantify learning outcomes. Gandolfi et al. (2020) conducted a study that introduced the Extended Reality Presence Scale to measure learners' engagement and presence in extended-reality environments. This scale adds a new dimension to assessments that are lacking in existing methods. This suggests that extended-reality technology integration can provide more dynamic and responsive assessment methods as tools in the evaluation process.

Finally, organizational support is crucial for ongoing development in educational environments. The advancement of the metaverse extended-reality framework necessitates the consistent evaluation and revision of tools, content, and instructional approaches in response to feedback and technological improvements. This guarantees that the framework stays current and practical. This entails keeping abreast of the most recent metaverse extended-reality technology, modifying instructional content to more effectively cater to the needs of learners, and consistently assessing the efficacy of the tools in education. Geisen and Klatt (2022) proposed the use of real-time feedback mechanisms in extended reality to promote ongoing development in education. They argue that these techniques can be modified for wider educational use to boost learning outcomes. Thus, the organization's support could start by clearly defining its objectives in utilizing extended-reality technologies and promoting a culture that fosters experimentation and innovation. This approach ensures that the integration of extended reality into educational practices remains dynamic, effective, and aligned with educational goals.

Based on the abovementioned discussion, the six components namely technology infrastructure, technology familiarization, instructional design, content development, assessment and evaluation, and continuous improvement play crucial roles in ensuring a successful integration of metaverse extended-reality technologies into hospitality education. This section discusses the importance of these components and how each component helps educators and institutions produce a comprehensive and efficient online learning pedagogy. Based on the importance of these components, a conceptual framework of extended reality metaverse-based educational pedagogy is illustrated in Figure 1.

Figure 1: Extended Reality Metaverse Empowered Educational Pedagogy Model



4. Strategies to Integrate Extended Reality Metaverse Educational Pedagogy Framework

Integrating metaverse technologies into online hospitality education involves the creation of an immersive and interactive virtual environment that simulates real-world scenarios of hospitality settings. Strategies for the integration must relate to the curriculum itself, technological investment, training for instructors and students, stakeholder involvement, and continuous assessment of metaverse technologies. First, the integration of extended reality into online hospitality education must focus on curriculum improvement. Traditional learning methods and pedagogies must be modified by creating virtual classrooms that simulate hospitality scenarios. This can be done by creating a metaverse-based module that aligns newly created activities with the current curriculum and learning outcomes. Revising curriculums by incorporating courses and training will enhance the learning experience of current students and enable future students to easily integrate metaverse technologies into learning (Al-Adwan et al., 2023).

Secondly, the successful implementation of metaverse technologies in hospitality education lies within the investment in extended reality equipment. According to Al-Adwan et al. (2023), providing access to virtual or augmented reality devices is the basis for a metaverse-based education as it creates a virtual campus for instructors and students to immerse and interact through virtual classrooms. They also suggested a few other ways of successful implementations, including the installation of a high-speed Internet connection that supports smart wearable devices and the use of gamification to increase perceived enjoyment among students. Accessibility and technological infrastructure in terms of stability and speed of the Internet are critical factors affecting students' perceived ease of use (Akyürek et al., 2024).

The next strategy for the integration of metaverse technology is professional training for instructors. Metaverse technologies are new to a lot of educators. Providing training in metaverse technologies usage will familiarise instructors with metaverse platforms, tools, and devices that enhance their effectiveness in creating and managing virtual teaching activities; at the same time, trained instructors can help students get comfortable and proficient in using metaverse for learning (Al-Adwan et al., 2023). This is agreed by Akyürek et al. (2024) who stated that improving instructors' know-how skills will increase their acceptance of new technologies. However, a one-time training is insufficient. Institutions must provide continuous support and training to help instructors keep up with the latest developments in metaverse technologies. Educators also need to pay close

attention to those students with special needs, such as autism, so that they will not be left behind (Md Nor et al., 2023)

Integration of metaverse technologies into the current hospitality education curriculum directly affects students. Therefore, the fourth strategy is to enhance student engagement and interaction. To do these, institutions must design an interactive virtual environment that is realistic for students to practice hospitality (e.g., hotel operations, airline operations, F&B services) skills. Institutions may also use metaverse technologies to encourage collaborative projects where students can be exposed to real-world hospitality operations (Griffin, 2021). Instructors also play an important role in enhancing student engagement and interaction with metaverse technologies. By creating a supportive learning environment such as necessary resources and clear learning objectives, students will understand each assignment within the metaverse-based module and trust that metaverse technologies are beneficial to their learning (Al-Adwan et al., 2023). The importance of institutions in providing training for students to adopt metaverse technologies is also highlighted by Akyürek et al. (2024) who suggested proper guidance will enhance students' perceived ease of use of new technologies.

Lastly, strict policies, rules and regulations must be implemented to guide metaverse-based education. Metaverse technologies can be double-edged swords that benefit and harm the users. While metaverse technologies are beneficial in improving learning outcomes, they challenge users in terms of the risk of privacy security (Zhou & Kim, 2022). Zhang et al. (2022) suggested the content and its creators be traceable to ensure the safety and security of its users. Al-Adwan et al. (2023) suggested the establishment of law enforcement authorities who can govern relevant laws such as real-name verification.

The integration of metaverse technologies offers a few benefits to both students, instructors, and higher learning institutions. First, it enhances teaching and learning experiences. The immersive nature of metaverse technologies allows instructors and students to immerse and interact in the simulation of real-world hospitality scenarios (Onu et al., 2024). This not only improves students' practical skills and better prepares students for employment, but the interactivity and engaging nature of the metaverse experience will also increase students' engagement and enthusiasm for learning. This leads to the second implication, in which integrating metaverse technologies into hospitality education will help develop skills and operational proficiency for students. Through the simulations of real-world hospitality scenarios, students can practice various skills, including front desk operation skills and F&B skills (Patiar et al., 2021).

However, a few challenges arise in the successful implementation of metaverse technologies in hospitality education. First, not all institutions can afford investment in such technologies. Secondly, not all students have access to extended reality devices. In these cases, these challenges must be taken into consideration as access to the devices is the basis for a successful implementation of metaverse technologies. Ensuring all instructors and students have access to relevant devices and stable and high-speed Internet is important to avoid failure. Next, the cost of implementation is high (Mystakidis, 2022). Metaverse technologies require significant investment in devices such as headsets, virtual reality glasses or a computer lab. This presents certain barriers to some institutions. Still, the metaverse offers possibilities for innovative teaching and learning experiences and transforms traditional hospitality education. It enables collaboration among instructors and students from all around the world for an enhanced learning experience. Thus, strategic integration of metaverse technologies into online hospitality education can provide students with cutting-edge and experiential learning that better prepares them for the evolving industry. Successful implementation of the metaverse will also enhance the institution's reputation and competitive advantages.

5. Conclusion

The paper discusses the integration of metaverse and extended reality technologies into hospitality education. It emphasizes the importance of instructional design, content development, assessment techniques, and organizational support for effective implementation. It outlines the need for technological investment, instructor training, and student engagement while addressing challenges such as high costs and access to technology. Additionally, it presents then strategies to integrate metaverse's applications in hospitality education, particularly in online learning contexts. However, several limitations should be addressed, such as the need for high-speed internet access, potential privacy concerns, and the digital literacy gap among the

students. Failing to consider these issues could hinder the effective implementation of metaverse extended reality technologies in online hospitality educational settings. Future research directions should focus on developing robust frameworks for integrating metaverse technologies into online hospitality education. Scholars should evaluate the long-term impacts of metaverse extended reality technologies on online learning outcomes. Additionally, future studies could investigate how metaverse applications can enhance experiential learning and customer service training. This can ultimately contribute to a more comprehensive understanding of the role of metaverse extended reality in online hospitality education.

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