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Metaverse in tourism education: A mixed method on vision, challenges and extended technology acceptance model

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A R T I C L E I N F O

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A B S T R A C T

The metaverse, an emerging educational frontier, presents boundless opportunities and distinct challenges for educators and students alike. This study delves into these aspects within the context of tourism education, employing a mixed-methods approach. It integrates in-depth interviews with 13 tourism academics and a quantitative survey of 268 tourism students. The qualitative data are meticulously coded, and the quantitative data are analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). This research not only conceptually outlines the future benefits of the metaverse, such as enhanced interactive learning and global classroom experiences but also empirically examines its impact on tourism students' engagement and learning outcomes. Key findings highlight both the empowering potential and the infrastructural and accessibility challenges posed by metaverse technology in tourism education. Ultimately, this study provides a holistic view of metaverse-based education's role in advancing the tourism industry, suggesting practical implications for technological adaptation and pedagogical strategies.

1. Introduction

Increasing technological developments in the 21st century have made rapid progress in the field of education, as in every field. One of these advances is virtual education. The metaverse, which has been designed especially since the end of the 1990s and designed to adapt to current changes and technology, is a candidate to be one of the most significant technologies of our time (Onggirawan, Kho, Kartiwa, & Gunawan, 2023). So much so that studies about the metaverse have been increasing rapidly in recent years. Metaverse technology has also attracted a lot of attention in the field of tourism, and studies dealing with various aspects of metaverse technology have increased in recent years (Buhalis & Karatay, 2022; Gursoy, Malodia, & Dhir, 2022; Koo, Kwon, Chung, & Kim, 2022). In particular, studies on research topics such as metaverse experience, metaverse tours, and metaverse tourism stand out. The metaverse, which has started to be talked about in most areas of life, promises a great innovation for education and even a new learning environment. If the metaverse means a changing world, society and even the self and opens the gate to a new world, cooperation between the metaverse and education is important for raising students/professionals who are compatible with this world (Alfaisal, Hashim, & Azizan, 2022; Lee, 2022). Metaverse can provide enhanced immersive experiences and a more interactive learning experience for students in learning and educational environments (Almarzouqi, Aburayya, & Salloum, 2022).

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The inclusion of both theoretical and practical courses in tourism education and the teaching of different courses according to different types of professions in the sector expand the scope of tourism education. Especially in departments such as tourism guidance, gastronomy and culinary arts, the practice-oriented course causes some problems in tourism education. Problems such as lack of practice areas in tourism education, budgetary problems in kitchen practices, costly tourist guide practice trips, and insufficient professional experience of instructors draw attention (Okumus & Yagci, 2005). However, face-to-face education in the field of tourism is interrupted and a quality education and training process cannot be carried out during periods of negative times such as epidemics (such as COVID-19), natural disasters (eg. earthquakes). In this context, especially during crisis periods such as the pandemic and natural disasters, the development of new approaches, ideas, and practices in education has become highly important. In recent years, the health crisis brought about by the Covid-19 pandemic has presented opportunities for universities to utilize Augmented Reality (AR), Virtual Reality (VR), and metaverse technologies. Furthermore, it can be argued that providing useful, engaging, and enjoyable educational experiences has become a necessity in the field of education, especially to capture students' interest (Dwivedi et al., 2022; Hasenzahl, Ghezili, & Cantoni, 2022; Shen, Xu, Sotiriadis, & Wang, 2022).

Additionally, in tourism education, where both theoretical and practical training are provided, it is essential to clarify how metaverse technologies can be effectively employed. Tourism education includes both theoretical and practical courses, covering various professions within the sector. This diversity requires an expansion of the scope of tourism education, and determining how metaverse technologies can be integrated is a crucial aspect. From this point of view, it is a matter of curiosity what opportunities metaverse technology can offer in solving these problems experienced in tourism education. However, metaverse technology is likely to have negative effects on tourism education. In the qualitative part of this study, the possible positive and negative effects of metaverse technology on tourism education will be revealed. In this regard, efforts are being made to understand the factors that can influence students' intentions to adopt this technology.

Universities and other higher education institutions around the world today face a complex set of challenges and problems. While some of these challenges are inevitable in nature, others have emerged due to the impact of the health crisis we are experiencing worldwide. In this context, there is a need for continuous improvement for universities to design and develop effective student experiences. In times of crisis, new approaches, innovative ideas and practices are indispensable. At this point, current crises provide an opportunity to consider how they can leverage the potential of digital technologies such as the metaverse and deliver these technologies to students more effectively.

There is an increasing need to provide students with useful, interesting and entertaining educational experiences. Existing literature shows that technology-based applications can play an important role in the learning and teaching experience and make these experiences more effective. However, it is important to remember that technology-based educational practices are not a definitive solution for university education, and the implementation of these technologies presents some challenges for all stakeholders. This article argues that the key is the proper process of approaching, evaluating and accepting these digital applications. To achieve this strategic goal, universities and education practitioners need to gain an in-depth understanding of students' perceptions. In this context, the study has a pioneering research quality in the field of tourism.

The main goal of the study is to determine what kind of opportunities metaverse technology can offer in the future on the basis of theoretical and practical courses such as tourism guidance, gastronomy, hospitality management. It is thought that the results obtained will provide important ideas about what steps can be taken for the use of metaverse technology in tourism education. Mixed-method was adopted in the study and the data was obtained from interviews with academicians who are experts in the field of tourism. If higher education institutions want to enhance the quality of their educational services using metaverse technology, they should develop appropriate applications. However, the perspective of students plays a crucial role when decisions regarding the implementation of such technologies are made. Understanding how students perceive this technology and their intentions to use it is of paramount importance for the successful adoption of metaverse technology in higher education. In developing countries, there may be deficiencies in the future adoption of such technologies due to the lack of sufficient studies on their usage. Therefore, this study aims to address the existing research gaps in the adoption of metaverse technology in tourism education in Turkey.

2. Literature review

2.1. Metaverse and education

The concept of metaverse was first mentioned in the novel "Snow Crash" written by Neil Stephenson in 1992 (Chua & Yu, 2023; Kaddoura & Al Husseiny, 2023). In this novel, the "Metaverse" represents a 3-dimensional virtual world. "Meta" means virtual and "verse" means universe (Lee, 2021). "Metaverse" is also explained as the Greek word beyond the universe (Chua & Yu, 2023). This term refers to a new digital world created through digital media such as smartphones and the internet (Kye, Han, Kim, Park, & Jo, 2021). The metaverse is a fully immersive, three-dimensional virtual world parallel to the physical world (Zhou, Chen, & Jin, 2023). Gursoy et al. (2022) defined the metaverse as a digital space that allows users to interact socially, generate value, and co-create experiences using digital avatars. Activities designed in this digital world are carried out with the help of 3D virtual sharings that include augmented and virtual reality services (Damar, 2021). It allows users represented by avatars in the metaverse to connect and interact with each other, and to experience user-generated content in a synchronized and permanent environment (Weinberger, 2022).

It can be said that with the Covid-19 epidemic, people have become accustomed to many other forms of distance interaction such as distance working and telemedicine. In the field of education, as in other fields, metaverse has become a focal point. Additionally, it can be noted that with Facebook's rebranding as Meta, interest in the use of metaverse in the field of education has increased (Kaddoura & Al Husseiny, 2023). Currently, applications such as augmented reality, mirror worlds and virtual reality attract attention within the scope of education in the metaverse (Kye et al., 2021). Although the emergence of metaverse in the field of education is the virtual reality application called "Second Life" established in 2008, research on metaverse in this field reached its peak in 2022 (Chua & Yu, 2023). "Extended Reality (XR)" application is one of the metaverse applications used in education. Educational services can be provided to students remotely located in virtual metaverse classes created with the XR technology used in this application. Additionally, interactive and collaborative tools of distance education are frequently used, minimizing the need for travel (Jagatheesaperumal, Ahmad, Al-Fuqaha, & Qadir, 2022). Another technology used in education is virtual reality (VR) technology. This technology attracts students' attention and helps them make their learning process more entertaining and exciting. Additionally, metaverse technology encourages students to understand information in detail (Hui et al., 2022; Lee & Hwang, 2022). "Mirror worlds", in which the real world is digitally mapped, and real environments and their functioning are transferred to a software model, are frequently used both in education and other fields (Gurrin, Smeaton, & Doherty, 2014).

Metaverse based online education is the combination of metaverse and education, defined as the use of metaverse in the field of education. Metaverse-based online education creates digital identities for teachers, students, and other stakeholders, opens formal and informal teaching and learning spaces in the virtual environment, and allows students and academics to collaborate in the virtual environment (Chen, 2022). The emergence of the metaverse has brought a brand new imagination to society. In particular, the opportunities offered by the metaverse with education will offer all kinds of new visions to students, teachers, and the sector as a whole. So much so that, with the developments in this field, Facebook announced the name change to "Meta". At the end of October 2021, it allocated a fund of $ 150 million to establish an educational learning ecosystem in metaverse and create immersive and interesting educational scenarios (Park & Kim, 2022).

Along with the investments made in education in the metaverse environment, there are also important developments in the tourism sector. It is suggested that metaverse technology will have significant impacts on tourism in the coming years as it transforms guests' experiences before, during, and after their travels (Buhalis, Lin, & Leung, 2023; Buhalis & Karatay, 2022; Dwivedi et al., 2022; Gursoy et al., 2022; Koo et al., 2022). The metaverse tourism ecosystem can be considered as a rapidly growing digital space that includes multi-user virtual worlds and social, economic, tourism and political activities connected to the real world (Koo et al., 2022). For tourism and hospitality fields, defining metaverse tourism involves metaverse environments that maintain tourists with spatial or tour experiences. Interacting with metaverse environments can augment tourists' experience of a tourism destination or product (Go & Kang, 2023). Additionally, it is suggested that the extended metaverse environment can create user satisfaction and tourism experience in the smart destination in a way that supports sustainable tourism (Suanpang et al., 2022). In this context, it is thought that with the development of the metaverse tourism ecosystem, there will be serious breakthroughs in tourism education in these environments.

3. Theoretical background and hypotheses development

3.1. *Technology acceptance model*

The Technology Acceptance Model (TAM) was developed to determine user behavior and intentions in adopting new technologies (Davis, 1986; 1989). This proposed model is built upon two fundamental factors: "perceived ease of use" and "perceived usefulness" are the core components of this model. Perceived usefulness is formed by the belief that the technology in question can enhance performance in the area it focuses on. Perceived ease of use, on the other hand, is the belief that using the new technology will not require extra effort (Davis, 1989). These two variables differ in individuals' perceptions of adopting a new technology. In other words, while perceived ease of use focuses on perceptions related to effort (PEOU), perceived usefulness is oriented towards efficiency or performance (Venkatesh & Davis, 2000). Regarding TAM, Venkatesh and Davis (1996) have suggested that perceived ease of use and perceived usefulness structures alone may be insufficient to explain the technology acceptance model comprehensively. They proposed that certain external variables can also influence this cognitive structure.

Since Davis proposed the Technology Acceptance Model (TAM), the model has continued to be used and examined from various perspectives (Go, Kang, & Suh, 2020; Goh & Wen, 2021; Scherer, Siddiq, & Tondeur, 2019). However, TAM provides a general framework for users' perceptions about new technology and its adoption. Further research is needed concerning the use of relevant technologies in different domains. The advancement of information and communication technology has also made technology-based learning systems a trend. In recent years, the frequent combination of education and technology has led to several studies that have used TAM to investigate students' perceptions of accepting e-learning systems (Al-Adwan et al., 2023; Ibrahim et al., 2017; Scherer et al., 2019). It is known that many studies in the field of tourism, particularly in university education and online learning, have been conducted within the framework of TAM (Fatima, Ghandforoush, Khan, & Masico, 2017; Han & Sa, 2021; Shen et al., 2022; Wojciechowski & Cellary, 2013). This demonstrates that the TAM is the most efficient theoretical model for measuring the adoption of new technologies in education. Therefore, the theoretical background of this research is based on TAM.

In general, technology-based instructional systems (such as metaverse, VR, etc.) offer richer and more diverse content compared to standard courses. However, only a limited number of studies have utilized the Technology Acceptance Model (TAM) to examine metaverse-based educational activities. Based on TAM and its appropriate extension and modification in the relevant literature, we are testing a new conceptual model to predict students' intentions to engage with and use the metaverse system. This model encompasses external variables, perceived variables, and, as a result, intentions to use. Therefore, this research is focused on the adoption of metaverse technology in tourism education.

3.2. Perceived ease of use

Perceived ease, in the context of technology, refers to the user's perception of how effortless it is to access a technology system and interact with its interface. Drawing upon the Technology Acceptance Model (TAM) initially proposed by Davis in 1986, the perceived ease-of-use stands out as a pivotal determinant influencing users' willingness to adopt and embrace a given system. Davis (1986) characterizes ease-of-use as the degree to which users believe that employing a particular system will require minimal effort on their part. In simpler terms, the more users perceive a system as user-friendly and straightforward, the more inclined they become towards using it. The fundamental tenets of the TAM framework postulate that an individual's utilization of technology is contingent upon their acceptance of that technology. Hence, the researcher proposes the following.

H1. Perceived ease of use (PEU) positively effects students' attitude toward use (ATU) metaverse education system.

Davis, Bagozzi, and Warshaw (1989) empirically tested the original Technology Acceptance Model (TAM) and, claiming that it was a simple model to predict user acceptance behavior, proposed a revised TAM. This revised model is based on three main constructs: perceived usefulness, perceived ease of use, and behavioral intention. Davis, Venkatesh, and others also argue that attitude plays a limited role in explaining behavioral intention or actual adoption behavior and serves as a partial mediator in the relationship between beliefs and user acceptance (Davis et al., 1989; Venkatesh, 2000). Ultimately, according to Davis's model, technology usage is determined by behavioral intention, which is influenced by attitude. Thus, the proposition is as follows.

H8. Attitude toward use (ATU) mediates the effect of perceived ease of use (PEU) on behavioral intention to use (BIU) metaverse education platform.

3.3. Perceived usefulness

According to Davis et al. (1989), the concept of Perceived Usefulness (PU) can be defined as the degree to which an individual believes that using a particular system will enhance their overall performance. In the specific context of this research study, PU is defined as the measure of a user's confidence in the capacity of a specific metaverse education platform to enhance the efficiency and effectiveness of the educational process. Consequently, as Gao and Bai (2014) have noted, this heightened perception of PU plays a significant role in elevating the user's overall satisfaction level, thus increasing their intention to adopt and use these technological solutions. This extended version provides additional context and detail concerning the concept of Perceived Usefulness and its relevance to the study, enhancing the overall understanding of the subject matter. Based on this, the researchers have formulated the following hypotheses.

H2a. Perceived usefulness (PU) positively effects students' attitude toward use (ATU) metaverse education platform.

H2b. Perceived usefulness (PU) positively effects students' behavioral intention to use (BIU) metaverse education platform.

H9. Attitude toward use (ATU) mediates the effect of perceived usefulness (PU) on behavioral intention to use (BIU) metaverse education platform.

3.4. Attitude towards use and behavioral intention to use

The Technology Acceptance Model (TAM), adapted from Ajzen and Fishbein's (1980) Theory of Reasoned Action (TRA) to explain information technology (IT) acceptance behaviors, elucidates the causal relationships between internal psychological variables—beliefs, attitudes, and behavioral intentions—and actual system usage (Davis et al., 1989). TAM assumes that a person's perceptions of the usefulness and ease of use of an IT shape their attitude toward IT use, which, in turn, leads to acceptance and usage. Individuals are more likely to have a stronger intention to perform a behavior if they evaluate that behavior positively. For example, if someone perceives a new technology as useful, their intention to use that technology may be higher. Therefore, based on this.

H3. Attitude towards use (ATU) positively effects on students' behavioral intention to use (BIU) of metaverse education platform.

3.5. Perceived enjoyment

Perceived Enjoyment (PE) is defined as reflecting not only the performance outcomes of technology use but also the pleasure a person derives from using that technology (Davis, Bagozzi, & Warshaw, 1992). Perceived enjoyment plays a significant role in the technology acceptance process, and the relationship between perceived enjoyment and perceived ease of use has been supported by numerous studies (Venkatesh, Speier, & Morris, 2002; Yi & Hwang, 2003). Within the TAM framework, Davis et al. (1992) proposed that perceived enjoyment is a factor similar to internal motivation that influences the performance of an activity. Additionally, Venkatesh (2000) found that as users gain more experience with a system over time, perceived enjoyment has a stronger impact on perceived ease of use. These findings demonstrate that how much users enjoy using a system affects their perception of ease of use.

In this specific study, the aim is to determine the levels of enjoyment perceived by students regarding metaverse education and to assess its explanatory power on Perceived Ease of Use (PEU) and Perceived Usefulness (PU). Previous studies have established the significant impact of PU and PEU in technology-based learning (Chang, Hajiyev, & Su, 2017; Ramírez-Correa et al., 2015; Lin, Chen, & Yeh, 2010). In general, it is known that PE has a positive impact on PEU and PU. In other words, when users believe, they will enjoy using a new technology, they also believe they will be able to use it easily and enhance their performance in the respective domains.

Based on this, the following hypotheses have been formulated.

H4a. Perceived enjoyment (PE) positively effects on students' perceived usefulness (PU).

H4b. Perceived enjoyment (PE) positively effects on students' perceived ease of use (PEU).

3.6. Perceived accessibility

Perceived Accessibility (PA) is a concept that denotes how easily users can access information from a system and use that information (Al-Debei, 2014; Park, 2009). Existing literature indicates that perceived accessibility has a significant impact on perceived ease of use (Almaiah et al., 2016; Park, 2009; Martínez-Torres et al., 2008; Park, Nam, & Cha, 2012) and perceived usefulness (Almaiah et al., 2016; Salloum, Alhamad, Al-Emran, Monem, & Shaalan, 2019). In technological systems such as e-learning systems (AR, VR, and metaverse, etc.), when students find these systems accessible, the likelihood of the systems being perceived as useful and easy to use increases (Almaiah et al., 2016; Salloum et al., 2019; Park et al., 2012). When a student perceives the metaverse education platform as accessible, they are likely to believe that such a system is more useful and easier to use. In this context, we proposed following hypothesis.

H5a. Perceived accessibility (PA) positively effects on students' perceived usefulness (PU).

H5b. Perceived accessibility (PA) positively effects on students' perceived ease of use (PEU).

3.7. Perceived risk

Perceived risk refers to the concern an individual has regarding the potential negative outcomes while using a new technology. Previous research has shown that perceived risk is a significant factor in determining whether individuals are willing to accept or implement a specific behavior (Ajzen, 1985; Quintal, Lee, & Soutar, 2010). These studies emphasize that individuals evaluate the potential risks associated with an action before deciding whether to perform that action, and this assessment influences their behavioral intentions. Perceived risk is a critical factor that shapes individuals' decisions to adopt or reject an action. It can be one of the factors that make the use of technology more difficult or complex. When individuals evaluate the potential risks associated with using a technology, their perceptions of ease of use can also be affected. In other words, a high perceived risk can strengthen the perception that using technology is challenging or risky. Similarly, perceiving a high level of risk can have a negative impact on perceived usefulness (PU). Numerous studies in the literature have demonstrated an inverse correlation between risk perception and PEU and PU (Girish, Kim, Sharma, & Lee, 2022; Kim, Pongsakornrungsilp, Pongsakornrungsilp, Cattapan, & Nantavisit, 2022). Based on this.

H6a. Perceived risk (PR) negatively effects on students' perceived usefulness (PU).

H6b. Perceived risk (PR) negatively effects on students' perceived ease of use (PEU).

3.8. Perceived complexity

Complexity, in the context of this study and in its simplest definition, is a degree that indicates how difficult it is to understand and use an innovation (Rogers & Shoemaker, 1971; Momani & Jamous, 2017). Tornatzky and Klein (1982) found an inverse relationship between the level of complexity and the rate of adoption of an innovation. If personal use of a new technology (such as metaverse) is considered in the context of innovation adoption, these results suggest a negative relationship between complexity and usage. In the information systems literature, Davis and others (1989) proposed a technology acceptance model that includes a construct they called "perceived ease of use," which measures the extent to which users expect the system to work smoothly. In their studies, they identified a positive relationship between perceived ease of use and behavioral intentions. However, this study focuses on the perceived complexity of the metaverse education system, which is the opposite of ease of use. Specifically, low complexity is expected when adopting a new technology. For technology to be perceived as user-friendly and simple, the level of complexity should be low (Akour, Al-Maroof, Alfaisal, & Salloum, 2022). Therefore, this study assumes a negative correlation between the level of complexity perception and ease of use. The relevant hypothesis is as follows.

H7a. Perceived complexity (PC) negatively effects on students' perceived usefulness (PU).

H7b. Perceived complexity (PC) negatively effects on students' perceived ease of use (PEU).

4. Study 1: qualitative phase of the research

4.1. Qualitative research methodology

The purpose of this study is to determine the possible advantages and disadvantages of tourism education in the metaverse virtual environment and to reveal the acceptance level of education in the metaverse from the perspective of students. In this context, in-depth interviews were conducted with 13 tourism academics who have academic studies on the subject to collect in-depth information with the qualitative approach, which is the first phase of the research. Researchers think that purposeful sampling technique is the most appropriate sampling technique to suit the purpose of the study. Purposeful sampling focuses on including certain individuals or types of people with certain characteristics in the study (Lune & Berg, 2017) and selecting information-rich situations that will explain the problems being studied (Patton, 2015). For this reason, in the research, the criteria of teaching in the field of tourism and having knowledge about metaverse technology were taken into account in determining the sample. Starting from this point, firstly, academics who had academic studies on the metaverse in Turkey were identified and then a meeting appointment was requested from 25 academics. 13 academics agreed to participate in the interview, and the interviews were held online in a semi-structured format in March and April 2023.

The interviews lasted between 29 min and 75 min. First, the purpose of the study was explained to the interviewees and permission was requested to record the interviews. The academics who agreed to have the interviews recorded acted comfortably during the interview process and freely expressed their knowledge and opinions on the subject. During the interview, one writer was responsible for asking questions while another writer took notes. When the interviews started to repeat, it was assumed that the data had reached saturation with the 13th participant and the analysis process of the interviews began. The transcribed texts immediately after the interviews were analyzed by each researcher. The qualitative analysis process involves understanding the essence of large amounts of data by reducing the volume of raw data, identifying important patterns, and creating a logical chain of evidence for the phenomenon under investigation by extracting meaning from the data (Patton, 2018). In this context, data was first cleaned in the transcribed interview records, then patterns were extracted, and codes were extracted from the patterns. In this context, data was first cleaned in the transcribed interview records, then patterns were identified, and codes were extracted from the patterns. Manually obtained codes were visualized with a hierarchical code-subcode model using the MAXQDA 2020 program.

4.2. Analysis and findings

This section includes general descriptive information about the interviewees and findings obtained from the interviews. The interviewees are named P1, P2, P3 … The profiles of the 13 participants are presented in Table 1. Accordingly, the ages of the participants vary between 33 and 48 years old. The academic experience of the participants, 4 female and 9 male, varies between 4 and 22 years. The participants, who are experts in departments such as tourism management, guidance, and gastronomy, have experience teaching different lessons.

In the light of the interviews held in Fig. 1, the possible advantages and disadvantages of education in metaverse technology are presented holistically. Accordingly, the advantages of tourism education in the metaverse were evaluated in the categories of students, teachers, and physical facilities, and a total of 17 codes were identified. Additionally, the disadvantages that may arise as a result of the use of metaverse technology in tourism education consist of 9 codes (see Fig. 1).

4.3. Advantages of metaverse in tourism education

All participants agree that virtual education should be carried out as a supportive/complementary education model to face-to-face education in the metaverse that is expected to become widespread in the future. At this point, as a complementary education argument, the possible advantages of education in the metaverse are classified into three groups in terms of students, teachers, and physical

Table 1
Profile of interview participants.

Gender	Age	Title	Experience	Expertise	Main Lessons Taught
Female	46	Associate Professor	12	Strategic management and innovation	Entrepreneurship, career management, management and strategy
Female	48	Assistant Professor	22	Tourism technologies	Strategic management, scientific research methods, philosophy of science
Male	35	Research Assistant	10	Tourism guidance	Environmental management in tourism, tourism management, Anatolian civilizations
Male	34	Assistant Professor	8	Tourism management	Hotel automation systems, travel agency and tour operator
Male	42	Associate Professor	13	Tourism management	Front office services, ticketing, tourism marketing
Male	33	Assistant Professor	7	Gastronomy	Local cuisines, Turkish cuisine, special interest tourism
Male	35	Assistant Professor	5	Gastro guidance	Art history, museology, history of religions
Female	38	Associate Professor	13	Human resources management	Human resource management, entrepreneurship, organizational behavior
Female	45	Associate Professor	10	Tourism technologies	Tourism marketing, destination management, electronic tourism
Male	47	Professor	21	Tourism management	Ticketing and automation, research methods, reservation systems
Male	33	Assistant Professor	7	Gastronomy	Professional practice, professional English, food and beverage services management
Male	37	Lecturer	4	Gastronomy	Culinary practice lessons
Male	40	Associate Professor	13	Sustainable Tourism	Tourism Management, front office and automation, sustainable tourism

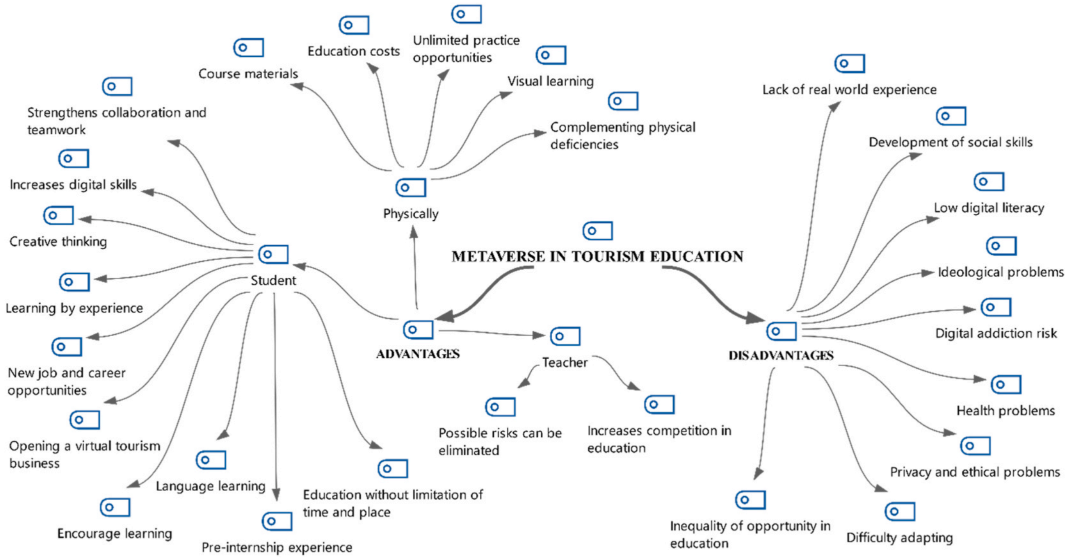

Fig. 1. Codes and subcodes of tourism education in metaverse.

facilities.

4.3.1. Advantages for students

For students, the possible advantages are as follows; language learning (mentioned 13 times), learning by experience (13), education without limitation of time and place (9), creative thinking (7), encourage learning (7), pre-internship experience (5), strengthens collaboration and teamwork (4), opening a virtual tourism business (3), new job and career opportunities (3) and increases digital skills (2). In particular, all participants state that tourism students will gain an advantage in learning a foreign language thanks to factors such as receiving training from teachers who speak their native language, establishing speaking classes, and increasing practice opportunities. P7 said the following on the subject: *Foreign language education can be taught by native-speaker teachers. Language can be learned more effectively with speaking classes in virtual environment.* In addition, all participants state that students can have a more active learning experience in both theoretical and practical courses in the metaverse. P3 expresses his/her thoughts about a more active learning experience as follows: *Students can explore different places and improve their guiding skills. It can provide interactive and more realistic experiences, especially in theoretical courses.*

Participants state that with the more active use of metaverse in education in the coming years, obstacles in terms of both time and space will be removed and a tourism education in which the borders will expand further will be possible. The statements of P1 and P3 are as follows: *Students will be able to participate in this virtual learning environment whenever they want without experiencing physical space problems … (P1). For example, when I am teaching about an ancient civilization in the Anatolian Civilizations lesson, I can explain this lesson to students in a more permanent way by living as if I were in that period (P3).* Moreover, the participants argue that metaverse technology can encourage learning more and enable more creative thinking by providing a more entertaining learning environment, unlike traditional learning methods, thanks to the virtual worlds, interactive games, and other learning materials offered by metaverse technology. And even, it is stated that thanks to the metaverse, a preliminary experience opportunity can be obtained for the internship, which is an important learning phase for tourism students. P6 describes this situation as follows: *With the further development of the metaverse, students can have pre-experience with the place or job where they will do the internship before starting the internship.*

Participants also said that students could increase collaboration and teamwork as they achieved a more interactive and entertaining educational environment thanks to their avatars in the virtual environment. Thus, they state that they can open virtual tourism businesses in these virtual environments and gain career opportunities in this virtual world by increasing their digital skills. P1's answer is as follows: *Metaverse can allow students to open, manage, or design virtual restaurants, cafes, or hotels. Thus, the student can have entrepreneurship and business experience in the virtual environment and be more effective in the real world …*

4.3.2. Physical advantages

Metaverse also attracts attention with the physical advantages that training in the virtual environment can provide. Particularly, it is stated by the participants that it may have advantages in terms of course materials and physical fields required in tourism education. As a result of the interviews, five codes were determined; education costs (mentioned 13 times), complementing physical deficiencies (12), visual learning (9), unlimited practice opportunities (8) and course materials (4). It was said that training in metaverse could provide advantages for guidance departments, especially in matters such as field trips and museum visits. It is also stated that it can provide advantages for gastronomy departments in accessing industrially developed kitchens, accessing difficult or expensive products, and processing expensive products by doing a lot of trial and error in the kitchens. P6 and P10's thoughts on the subject are as follows: *Metaverse can enable practice tours for guidance departments in the virtual world at less cost … In addition, it can provide access to* *expensive tools or expensive materials in gastronomy education in a virtual environment (P6). Physical deficiencies (such as kitchen, hotel room, service hall) needed in every department where tourism education is given can be provided in the Metaverse virtual environment (P10).*

4.3.3. Advantages for instructors

Participants mention that training in the metaverse can also provide advantages for instructors. It is stated that competition in education may increase (mentioned 3 times), especially if it is possible for students to take lessons from different teachers working at different universities in the virtual world. Furthermore, it is claimed by two participants that the risks that may occur in practice classes and field trips can be eliminated. *Dangers can be eliminated in practical lessons. For example, risks such as cuts, sprains and burns can be eliminated (P3). With virtual metaverse education, competition among teachers may increase and competition may lead to the emergence of higher-quality education. Through metaverse, students can take courses from the teacher they want, and thus education can be more qualified (P6).*

4.4. Disadvantages of metaverse in tourism education

In the interviews, participants stated that despite the contributions that tourism education can provide in the metaverse virtual environment, there may be some risks. Disadvantages consisting of 9 codes were determined in tourism education in the metaverse environment. These; difficulty adapting (mentioned 10 times), privacy and ethical problems (9), lack of real world experience (8), health problems (8), development of social skills (6), ideological problems (6), digital addiction risk (5), inequality of opportunity in education (4) and low digital literacy (2).

Participants stated that it may be difficult for students to adopt education in metaverse as one of the most important disadvantages. They point out that metaverse burnout, like Zoom burnout, may also occur. P10's statements are as follows: *Difficulty adapting to a new technology can reduce students' enthusiasm for learning. In addition, technological problems can hinder the learning process of students and reduce the quality of education (P10)*. It is also claimed that another drawback of education in the metaverse environment is privacy and ethical issues. Moreover, it is stated that negative situations such as theft of personal information, sexual harassment, perversion, failure to maintain discipline, and ideological concerns may arise in metaverse education. P13 expresses the risks that may occur in this direction as follows: *The fact that a legal ground has not yet been implemented in the metaverse environment may pose problems in terms of privacy and ethics.*

At the same time, participants say that an education provided in the metaverse environment can never replace real-world experience. Additionally, it is stated that excessive use of the metaverse may lead to some health problems and the risk of digital addiction. P9 said the following on the subject: *Wearing augmented reality glasses too much; it can cause health problems such as psychological disorders, dizziness, headaches … In addition, the metaverse virtual environment can isolate people and disconnect them from the real world (P9).* Of course, a life disconnected from the real world can prevent the development of students' social skills. Finally, some participants point out that not having equal access to the metaverse by all students may lead to inequality of opportunity in education. P3's thoughts are as follows: *Since the establishment of the metaverse environment is costly, it can create inequality of opportunity among students. It may not be possible for all students to easily access the metaverse environment (P3).*

5. Study 2: quantitative phase of the research

5.1. Quantitative research methodology

5.1.1. Data collection and sample design

This study aims to investigate the intentions of higher education students in the field of tourism to adopt metaverse technologies for educational purposes. To accomplish this objective, an extended Technology Acceptance Model (TAM) is proposed and empirically examined within the context of Turkish tourism students. While the integration of metaverse technology in education is still at its early stages, existing research on virtual worlds in education enables us to explore potential issues related to the adoption of metaverse technology in the educational domain. Moreover, testing hypothetical scenarios regarding new and unknown innovative technologies such as metaverse is a very challenging process (Chen, 2022). The participants in this study consist of tourism students who have prior experience with virtual learning (e.g., VR, AR, and online applications). Indeed, recent events such as the COVID-19 pandemic and earthquakes have led to the widespread adoption of technology-based education in Turkish universities. These participants are considered the most suitable for achieving the research objectives. Even if they do not have prior experience with metaverse platforms, their predisposition to technology-based education makes them valuable choices for the sample. However, it should be noted that the population for this study is undefined. In other words, there is no precise information available about the population of tourism students who have previously received technology-based education. Therefore, purposive sampling technique was used to obtain data. The purposive sampling technique involves the deliberate or conscious selection of participants due to specific characteristics that are relevant to the research objectives (Etikan, Musa, & Alkassim, 2016).

The data were collected through online survey forms between May 5, 2023, and June 28, 2023, following qualitative interviews. The survey was created using the Google Forms system. Survey links were distributed to the necessary academic connections at seven universities. The surveys were shared electronically with students who met the desired criteria. In total, data collection was completed with 268 participants.

5.1.2. Research instrument, survey structure and research model

The data collection instrument (survey) consists of four sections. In the first section, a control question was used to determine whether participants had prior experience with digital/hybrid or technological education such as AR and VR. Participants with such experience continued to fill out the survey. The second section contains the constructs of the Technology Acceptance Model. These include two items for Perceived Ease of Use (PEU), two items for Perceived Usefulness (PU), two items for Attitude Towards Use (ATU), and two items for Behavioral Intention to Use (BIU), all rated on a Likert-type scale. The third section includes external variables, comprising three items for Perceived Enjoyment (PE), five items for Perceived Accessibility (PA), three items for Perceived Risk (PR), and two items for Perceived Complexity (PC). The final section of the survey includes demographic questions about the participants, including gender, age, education level, and department.

In the second and third sections of the survey, a Likert-type scale was used. In total, 21 items were rated on a scale from 1 (Strongly Disagree) to 5 (Strongly Agree). The measurement model and constructs were developed based on the Technology Acceptance Model and previous studies in the field (see Table 2) (Davis, 1989; Barclay, Higgins, & Thompson, 1995; Doll, Hendrickson, & Deng, 1998; Venkatesh & Davis, 2000; Bennett & Bennett, 2003; Im, Kim, & Han, 2008; Teo, Luan, & Sing, 2008; Ozturk, Nusair, Okumus, & Hua, 2016; Salloum et al., 2019; Simanjuntak & Purba, 2020; Akour et al., 2022; Salloum et al., 2023). In this study, a pilot test was conducted to determine the internal consistency of each construct. As a result of the pilot test, it was found that the Cronbach Alpha values for all constructs were above 0.70. After conducting the pilot test on a sample of 50 students and ensuring the reliability of the scales through reliability testing, data collection continued (see Table 3).

5.1.3. Data analysis

Two separate statistical programs were used for the analysis of quantitative data. Initially, we utilized the SPSS 24.0 software to systematically organize the data collected. Using this software, we created a structured database and uploaded the data into the system, making it ready for analysis. In this stage, we primarily employed frequency and descriptive statistics. We used PLS-SEM technique to evaluate the structural model. Subsequently, the established database was imported into the Smart-PLS program for the evaluation of measurement and structural models. The choice of Smart-PLS was motivated by its advantages, including flexibility in structural equation modeling employing the least squares method, independence from normality assumptions, and, most significantly, its capability to provide reliable predictions even with small sample sizes (Hair, Sarstedt, Ringle, & Mena, 2012).

Table 2
Measurement items and confirmatory factor analysis.

Measurement items and constructs	Factor Loading	Cronbach Alpha	(Rho_A)	Composite Reliability	AVE
Perceived Enjoyment (Venkatesh & Davis, 2000; Salloum et al., 2023).					
Metaverse education offers a fun environment.	0.941	0.917	0.922	0.948	0.858
Metaverse education offers an entertaining educational setting.	0.962				
I am ready to use metaverse education because it provides me with a comfortable atmosphere.	0.874				
Perceived Accessibility (Park, 2009; Salloum et al., 2019).					
I access and use the metaverse education system in the university without any problems.	0.870	0.909	0.911	0.924	0.858
The metaverse education system can be accessed appropriately by using the chain of communication.	0.892				
The metaverse education system is accessible according to my own possibilities.	0.817				
The chain of communication is suitable to get access to the metaverse education tool	0.837				
I have no difficulty accessing and using an metaverse education system in the university.	0.866				
Perceived Risk (Im et al., 2008; Ozturk et al., 2016).					
Metaverse education would frustrate because of its poor performance.	0.841	0.824	0.951	0.889	0.728
Comparing with other methods, metaverse has more uncertainties.	0.784				
Metaverse education would not be effective as I think.	0.928				
Perceived Complexity (Akour et al., 2022; Bennett & Bennett, 2003).					
I think metaverse education technology is very difficult to be used.	0.951	0.868	0.889	0.937	0.882
I believe it is hard to use metaverse on a daily basis.	0.928				
Perceived Ease of Use (Davis, 1989; Doll et al., 1998).					
I think metaverse technology is effortless.	0.912	0.878	0.903	0.921	0.654
I think metaverse technology will be difficult to use in certain circumstances.	0.731				
Perceived Usefulness (Davis, 1989; Doll et al., 1998).					
I think the metaverse technology is useful for live lectures and meetings.	0.916	0.833	0.842	0.923	0.856
I think the metaverse technology adds many advantages to my study.	0.935				
Attitude toward Using (Akour et al., 2022; Simanjuntak & Purba, 2020).					
I believe that metaverse education has great value in educational settings.	0.922	0.840	0.844	0.926	0.862
I believe that metaverse education has many advantages in my daily lectures.	0.934				
Behavioral Intention to Use (Barclay et al., 1995; Teo et al., 2008).					
I will definitely use metaverse in my education.	0.926	0.835	0.835	0.924	0.858
I will use metaverse for limited educational purposes.	0.927				

Table 3
Fornell-Larcker criterion and Heterotrait-Monotrait Ratio.

Variables	Fornell Larcker Criterion							
	1	2	3	4	5	6	7	8
Attitude toward using (1)	**0.817**							
Behavioral intention to use (2)	0.707	**0.926**						
Perceived Accessibility (3)	0.628	0.555	**0.857**					
Perceived Complexity (4)	−0.074	−0.052	−0.082	**0.939**				
Perceived Ease of Use (5)	0.471	0.395	0.516	−0.255	**0.918**			
Perceived Enjoyment (6)	0.639	0.639	0.715	−0.089	0.453	**0.926**		
Perceived Risk (7)	−0.361	−0.294	−0.186	0.417	−0.153	−0.229	**0.853**	
Perceived Usefulness (8)	0.688	0.564	0.587	−0.018	0.559	0.592	−0.333	**0.925**
Variables	**Heterotrait-Monotrait Ratio**							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Attitude toward using (1)	–							
Behavioral intention to use (2)	0.843							
Perceived Accessibility (3)	0.715	0.634						
Perceived Complexity (4)	0.114	0.068	0.090					
Perceived Ease of Use (5)	0.510	0.433	0.541	0.272				
Perceived Enjoyment (6)	0.728	0.732	0.785	0.095	0.474			
Perceived Risk (7)	0.390	0.338	0.201	0.508	0.156	0.235		
Perceived Usefulness (8)	0.821	0.675	0.669	0.021	0.612	0.677	0.356	-

5.1.4. *Demographic of participants*

When examining the distribution of participants by gender, it is observed that 41.2% are male and 58.8% are female. In terms of age groups, participants are distributed as follows: 28.2% are 20 years old or younger, 41.7% fall within the 21–22 age range, and 30.1% are 23 years old or older. Regarding the participants' educational levels, 71.3% are pursuing a bachelor's degree, while 28.7% are enrolled in associate degree programs. Furthermore, when considering the fields of study in which participants are enrolled, the breakdown is as follows: 41.2% are studying tourism guidance, 31% are majoring in tourism and hospitality management, 19.9% are in the field of gastronomy, and 7.9% are pursuing degrees in recreation management.

6. Findings

6.1. *Measurement model*

Some statistical results of the confirmatory factor analysis used in testing the measurement model are included in Table 2. As a result of the analysis, no expressions were disabled because all the expressions explaining the structures produced meaningful results during the analysis process. As a result of CFA, an eight-dimensional structure was formed in accordance with the model established

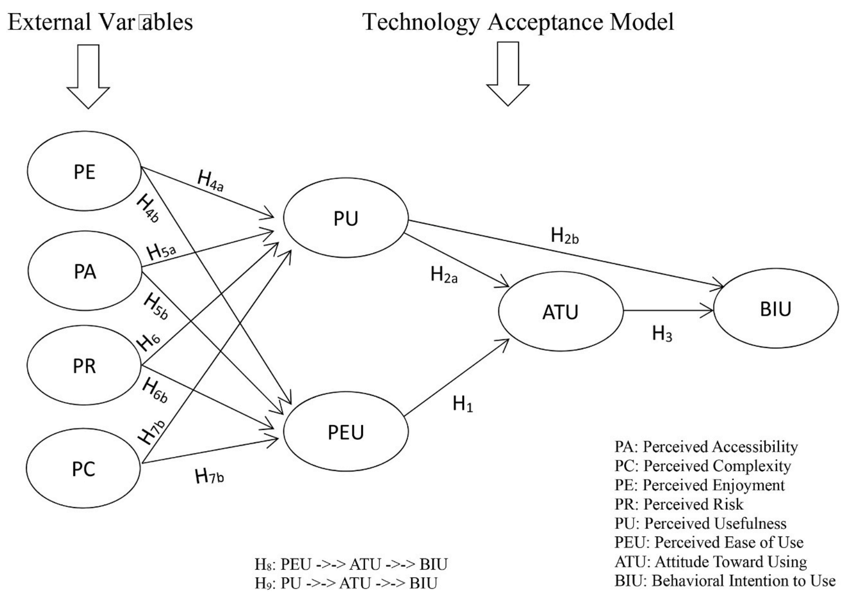

Fig. 2. Proposed research model.

within the scope of the research (See Fig. 2). Factor loadings for all statements were determined to be above 0.70, as predicted by Smart-PLS and Social Sciences (Salkind, 2015). Some information is also available regarding the validity and reliability of the constructs in the study (see Table 2). For reliability, Reliability Coefficient (Rho_A), Cronbach's Alpha, and Composite Reliability coefficients were examined. For all eight constructs, three reliability coefficients had values ranging 0.824–0.951.

For convergent validity, the square roots of the AVE values were examined. AVE values are expected to be above 0.50 predicted by social sciences (Hair, Black, Babin, & Anderson, 2010). All dimensions within the scope of the research received values ranging 0.654–0.882, and it can be said that the study dimensions provide convergent validity.

Other values checked for validity are the Heterotrait-Monotrait Ratio value and Fornell and Larcker Criteria. In Fornell and Larcker, the diagonal values in each row and column are expected to be the largest values to meet the validity condition (Fornell & Larcker, 1981). Since the diagonal values for all dimensions of the eight-dimensional structure in this study were large, the validity of the study was ensured within the scope of this criterion. The desired value of Heterotrait-Monotrait Ratio is expected to be in the range of 0–1. However, according to general acceptance, this value is expected to be less than 0.90 (Hair, Hult, Ringle, & Sarstedt, 2017). Heterotrait-Monotrait Ratio values of the measurement model in this study also explain that the validity condition in the study is met.

6.2. Structural model

In this part, the structural test of the established model was carried out. As a result of the established model, a total of 14 hypotheses, 12 of which measure direct effect and 2 of which measure mediator effect, were developed and these hypotheses were tested with structural model measurements (See Table 4). The support status of the hypothesis tests was examined by considering the t-statistic ($t > 1.96$), p value ($p < 0.05$) and Path Coefficients values. According to this information, 8 of the 12 direct effect testing hypotheses were accepted, while four were rejected. While one of the hypotheses measuring the mediating effect was accepted, the other was rejected. According to these results, Perceived Usefulness and Perceived Ease of Use related to the metaverse affect the Perceived Accessibility about metaverse. Similarly, Perceived Complexity effects Perceived Usefulness and Perceived Ease of Use. While Perceived Enjoyment and Perceived risk variables do not affect Perceived Ease of Use, they do affect Perceived Usefulness.

Perceived Usefulness regarding metaverse directly affects Attitude Toward Using to metaverse. Similarly, Attitude Toward Using directly affects Behavioral Intention to Use. When the mediating effects are examined (See Table 4), Attitude Toward Using towards the metaverse does not have a mediating effect on the effect of Perceived Ease of Use on behavioral intention to use. On the other hand, it has a mediating role in the effect of perceived usefulness on behavioral intention to use.

According to the fit values with the model, the Variance Inflation Factor (VIF) value is below 3, which is the value predicted by Smart-PLS (See Table 5). Q^2 values were examined to reveal the predictive power of the model. Blindfolding was performed for these values and analysis was made in the context of the entire model (Ali, Rasoolimanesh, Sarstedt, Ringle, & Ryu, 2018; Şengel et al., 2023). Based on the resulting Q^2 values, it can be said that the predictive power of the model is good (Henseler, Ringle, & Sinkovics, 2009). Also, the f^2 values, which measure the predictive power of the independent variables in the model, reveal that the structural model is compatible (Chen and Huang, 2019).

The study assessed the explanatory power of the independent variables in relation to the variance of the dependent variables using R2 values. The R2 values for the dependent variables, which were examined in terms of their explanatory capacity by specific variables within the research model, were found to be as follows: 0.326 for the Perceived Ease of Use variable, 0.461 for the Perceived Usefulness variable, 0.484 for the Attitude Toward Using variable, and finally 0.512 for the Behavioral Intention to Use variable. These results indicate that the dependent variables in the research model demonstrate explanation percentages ranging from 32.6% to 51.2%. These

Table 4
Path coefficients and hypothesis tests.

Hypothesis	Path Coefficients	t-stat.	p-value	Supported
Direct Effects				
H_1: PEU - > - > ATU	0.122	1.569	0.117	No
H_{2a}: PU - > - > ATU	0.620	8.997	0.000[a]	Yes
H_{2b}: PU - > - > BIU	0.147	1.543	0.123	No
H_3: ATU - > - > BIU	0.606	5.552	0.000[a]	Yes
H_{4a}: PE - > - > PU	0.310	3.452	0.001[a]	Yes
H_{4b}: PE - > - > PEU	0.170	1.785	0.074	No
H_{5a}: PA - > - > PU	0.329	3.894	0.000[a]	Yes
H_{5b}: PA - > - > PEU	0.385	4.338	0.000[a]	Yes
H_{6a}: PR - > - > PU	−0.261	3.309	0.001[a]	Yes
H_{6b}: PR - > - > PEU	0.054	0.701	0.484	No
H_{7a}: PC - > - > PU	0.145	1.989	0.039[a]	Yes
H_{7b}: PC - > - > PEU	−0.231	3.218	0.001[a]	Yes
Mediator Effects				
H_8: PEU - > - > ATU - > - > BIU	0.074	1.661	0.097	No
H_9: PU - > - > ATU - > - > BIU	0.376	4.756	0.000[a]	Yes

PA: Perceived Accessibility, PC: Perceived Complexity, PE: Perceived Enjoyment, PR: Perceived Risk, PU: Perceived Usefulness, PEU: Perceived Ease of Use, ATU: Attitude Toward Using, BIU: Behavioral Intention to Use.

[a] Significant at $p < 0,05$ level $t > 1.96$.

Table 5
Explained variance (R^2), the prediction relevance (Q^2), Effect size (f^2), and variance inflation factors (VIF) of formative models.

Independent variables	Dependent variables	R^2	Q^2	F^2	VIF
Perceived Accessibility	Perceived Ease of Use	0.326	0.291	0.108	1.000
Perceived Complexity	Perceived Usefulness	0.461	0.349	0.099	1.009
Perceived Enjoyment	Attitude Toward Using	0.484	0.393	0.510	1.022
Perceived Risk	Behavioral Intention to Use	0.512	0.406	0.397	1.113

Note: 5000 bootstrapping procedure used.

values suggest that the independent variables in the model possess a moderate level of explanatory power (Chin, 1998). In this context, the measurement model confirms the meaningfulness of the established model in the study, while the structural model reveals an explanatory relationship between the variables within the model.

7. Discussion, conclusions, and implications

7.1. Discussion and conclusions

The main purpose of this study is to identify possible advantages and disadvantages of tourism education in the metaverse virtual world through the analysis of 13 semi-structured interviews. Subsequently, it is to empirically test the main factors affecting the behavioral intentions of students receiving tourism education towards adopting education in the metaverse environment. When the relevant literature is examined, as far as we know, no direct study has been found examining the possible effects of metaverse technology on tourism education. However, no study has been found examining the perceptions of tourism students about adopting metaverse technology for education. As a matter of fact, although there is no study directly addressing tourism education in the metaverse environment, a significant increase has been observed in recent years in studies addressing education in metaverse technology in different fields.

It is stated in many studies that metaverse, as a technology, is still in its infancy and many questions regarding its correct use in education remain unanswered (Dwivedi et al., 2022; Kye et al., 2021; Park, 2021; Rahman, Shitol, Islam, Iftekhar, & Saha, 2023; Tlili et al., 2022; Tlili, Huang, & Kinshuk, 2023; Wang & Shin, 2022). Lucas, Benito, and Gonzalo (2013) argue that implementing 3D virtual environment in education would also cost too much time, design, and implementation, and therefore its development would be limited. However, revealing the advantages and disadvantages of education in metaverse, which is still in its infancy, and determining the factors that may be effective in the adoption of this platform by students are very important for the proper construction of the metaverse environment within the scope of education in the future.

According to the findings of this research, it has been determined that the metaverse environment can offer significant opportunities for tourism education in terms of theory, practice, and language learning. Especially in comparison to traditional education, it has been found that education in the metaverse environment can provide important opportunities for students, teachers, and physical resources. This conclusion is supported by the study conducted by Shu and Gu (2023). Previous research has also suggested that education in the metaverse environment could provide various opportunities. In this context, research highlights that more effective language learning can be achieved in the metaverse environment (Kanematsu, Fukumura, Barry, Sohn, & Taguchi, 2010, pp. 200–209; Lee, 2022; Nakahira et al., 2010; Park, 2021; Shu & Gu, 2023; Yoo & Chun, 2021), learning through experience will be more significant (Camilleri, 2023; Díaz, Saldaña, & Avila, 2020; Dwivedi et al., 2022; Zhou & Kim, 2022), it can foster creative thinking (Jang, Kim, & Kim, 2023), and promote learning (Chen, 2022; Jang et al., 2023; Zhou & Kim, 2022).

Especially with the development of education in the metaverse environment, it is emphasized that the limitations of time and place will be eliminated (Tlili et al., 2022), thus reducing education costs (Chen, 2022), addressing the necessary physical shortcomings for education (Rahman et al., 2023), and allowing for risky practices to be safely conducted (especially for practical lessons), providing opportunities for unlimited practice (see Chen, Zou, Xie, & Wang, 2023; Lee, Woo, & Yu, 2022).

Tlili et al. (2022) argue that spatial and temporal virtual freedom can potentially increase inclusivity and participation levels for students with disabilities and special needs. Moreover, there are studies (Díaz et al., 2020; Rahman et al., 2023; Shen et al., 2022) supporting the idea that collaborative learning opportunities and teamwork may thrive through education in the metaverse environment. The metaverse environment can also offer pre-internship experiences for tourism students, allowing them to gain valuable experiences in fields such as entrepreneurship and management by enabling them to explore various tourism businesses, which is an intriguing finding highlighted in the research. Şengel and Özeskici (2022) also propose that with the future development of the metaverse environment, tourism guidance could become possible in these virtual environments. Estudante and Dietrich (2020) point out that in the context of game-based learning, the platforms created by the metaverse can enhance students' learning motivation and communication skills.

Based on the results obtained from the interviews, it is noted that as education in the metaverse environment develops, educators may be inclined to further enhance their skills due to increased competition among them and to eliminate potential risks that may arise in practical courses. This finding aligns with the results of the study conducted by Rachmadtullah, Setiawan, Wasesa, and Wicaksono (2023), which aimed to determine how elementary school teachers in Indonesia perceive the potential of metaverse technology as a transformative learning environment. According to the authors, metaverse is seen as one of the options to improve learning performance for teachers and is mentioned as a tool that can assist teachers in effectively delivering course materials to students.

While the results suggest numerous opportunities that can be obtained through the implementation of tourism education in the metaverse environment, it's essential to acknowledge the potential drawbacks associated with metaverse-based education. Particularly, as highlighted in the study by Tlili et al. (2022), metaverse technology is expected to bring both blessings and curses for the industry and society, emphasizing the need for in-depth exploration before fully immersing into the metaverse world. In this context, concerns regarding the adaptation of both students and educators to education in this virtual environment are noteworthy, despite the attractiveness of tourism education in the metaverse environment. Dwivedi et al. (2022) suggest that young users may rapidly adapt to this new technology, but younger children and older individuals may encounter challenges. The authors point out that older individuals may lag behind in adopting these innovative technologies, while children may be exposed to risks associated with harmful virtual interactions. Furthermore, with the increasing trend of education in the metaverse environment, concerns related to privacy and ethics, ideological concerns, and worries about health and digital addiction come to the forefront. The results obtained align with previous studies (Camilleri, 2023; Chen, 2022; Dwivedi et al., 2022; Kaddoura & Al Husseiny, 2023; Kye et al., 2021; Pradana & Elisa, 2023; Zhou & Kim, 2022).

Zhou and Kim (2022) also express that ensuring the complete security of users' information can be challenging and there may be a risk of personal privacy breaches. Additionally, the authors suggest that since students spend significant time in the virtual world, those with weak self-control may develop social phobias, struggle to manage interpersonal relationships effectively and have difficulty adapting to the real world. Similarly, Pradana and Elisa (2023) emphasize the importance of considering accessibility and privacy concerns. Tlili et al. (2023) conducted a systematic literature review and identified and evaluated challenges that can arise in seven categories: regulation, security and ethics, technical issues, design, accessibility and health, digital literacy, and sustainability. In conclusion, the disadvantages identified in the interviews align with the findings of previous studies.

As a result, it seems possible that the use of metaverse technology in the field of education will become widespread soon. However, it is important to determine in advance the consequences that may arise from the use of metaverse technology in the field of education, to take precautions accordingly and to increase the efficiency of the use of this technology in the field of education. When the findings obtained are evaluated, it is obvious that significant advantages will be provided through the use of metaverse technology in tourism education. However, it is anticipated that some serious problems may arise along with the advantages to be gained. When the relevant literature is examined, although studies are addressing different aspects of the subject, this study presents a holistic picture of all the advantages and disadvantages that may be encountered.

7.2. Theoretical implications

This study responds to the call for research aimed at advancing our understanding of education in the metaverse environment in the future (Dwivedi et al., 2022; Kye et al., 2021; Tlili et al., 2022). Through a mixed-methods approach, our research contributes to the existing literature in several ways. First and foremost, to the best of our knowledge, this study is a pioneering effort that examines the potential advantages and disadvantages of education in the metaverse from the perspective of informed academics. In this regard, our study is significant for its comprehensive exploration of the possible pros and cons of education in the metaverse, unlike previous systematic studies on the subject (Alfaisal et al., 2022; Camilleri, 2023; Chua and Yu, 2023; Pradana & Elisa, 2023; Tlili et al., 2023). This study examined the adoption process of metaverse educational technology and offers important theoretical implications. The findings can be considered in line with technology acceptance and learning theories and can guide future research. Findings show that tourism students' intentions to use metaverse educational technology are strongly associated with perceived ease of use. This result can be considered in line with acceptance theories such as the Technology Acceptance Model (TAM). TAM suggests that users' intentions to accept a technology increase when they perceive the technology to be easy and efficient to use (Davis, 1989). This finding highlights the importance of ease of use for student acceptance of metaverse educational technology. According to this model, users' intentions to accept a technology are based on its perceived ease of use.

In contrast, research shows that perceived usefulness does not directly influence behavioral intention to use. This result shows that how useful students find metaverse educational technology does not directly affect their intention to use this technology. This finding indicates that students' finding a technology useful may not affect their intention to use it and suggests that other factors may also influence behavioral intention. These results may be consistent with Davis and Venkatesh's Technology Acceptance Models (TAM and TAM2) (Davis and Venkatesh, 2000; Davis, 1989). These models suggest that perceived usefulness may indirectly influence acceptance intention and also consider other factors that influence users' intention to use the technology.

The results show that tourism students' attitudes towards metaverse education are an explanatory factor for behavioral usage intention. This result can be considered in line with the Attitude-Behavior (A-B) theory. A-B theory suggests that a person's attitude can influence his or her intention to perform a particular behavior (Ajzen & Fishbein, 1980). It has been observed that when students develop a positive attitude towards metaverse education, their intention to use this technology also increases. The results obtained, in line with the theory, suggest that individuals' attitudes can affect their behavior.

It shows that perceived enjoyment of metaverse training affects perceived usefulness from this technology but does not have an interaction with perceived ease of use. This result shows that when users find the technology enjoyable, they see higher benefits from this technology. However, there was no interaction between perceived ease of use and perceived enjoyment, meaning ease of use did not moderate the effect of enjoyment. Perceived enjoyment and perceived ease of use are often considered important factors in explaining technology use (Venkatesh & Davis, 2000; Salloum et al., 2023).

It was found that perceived accessibility had a significant effect on both perceived ease of use and perceived enjoyment. These results suggest that the perception that metaverse educational technology, in particular, is accessible and easy to use enables students to evaluate and enjoy this technology positively. Additionally, perceived risk has been found to negatively impact the perceived usefulness of metaverse educational technology. This highlights that students tend to avoid using this technology and the risks need to be reduced. Finally, perceived complexity was confirmed to have a significant relationship with both perceived enjoyment and perceived ease of use. In other words, it has been observed that when students feel complexity while using technology, this affects both their ease of use and their enjoyment. Factors such as perceived accessibility, risk and complexity are factors that play an important role in technology acceptance and can affect users' technology acceptance processes (Rogers, 2003; Venkatesh & Bala, 2008).

The original Technology Acceptance Model (TAM) and expanded versions of this model have been studied extensively in a variety of information technology (IT) environments and have been recognized by many researchers and practitioners as a powerful and valid model for predicting individual acceptance behavior (Legris, Ingham, & Collerette, 2003). However, a meta-analysis of empirical studies based on TAM also reported that the results were not quite consistent or clear (Legris et al., 2003). Previous studies show that the results are mixed in terms of the mediating role of attitude in IT acceptance (Kim, Chun, & Song, 2009). In particular, some studies have reported that attitude provides a full mediation between beliefs and behavioral intention (Chen, Gillenson, & Sherrell, 2002; Hsu & Lu, 2004). However, other studies have shown that attitude only partially mediates the relationship between salient beliefs and behavioral intention (Moon & Kim, 2001; Yang & Yoo, 2004) or does not mediate at all (Kim et al., 2009; Riemenschneider, Harrison, & Mykytn, 2003). Within the framework of all these inferences, it is seen that similar results were reached in the attitude mediator variable tested in this research. Although the usage attitude towards metaverse educational technology partially mediates between perceived enjoyment and intention, no mediating role was found between perceived ease of use and intention to use.

In conclusion, the findings of this study can help us better understand the acceptance of metaverse educational technology and guide the more effective introduction and use of this technology. These implications can be an important contribution for educators and designers who want to increase the adoption and use of future educational technologies.

7.3. Practical implications

Although it is anticipated that advantages can be gained through the use of the metaverse environment in tourism education, some concerns also attract attention. In this context, it is important to minimize the negative situations identified within the scope of the study to use metaverse technology effectively in education. Therefore, practitioners who design the metaverse environment have important duties. These duties include carrying out technical studies on health problems, implementing training that will ensure students' adaptation and effective use of the platform, and providing security and ideological infrastructure.

The general structural model contributes by improving our understanding of students' motivation to use metaverse-based learning. This understanding can be helpful in promoting our metaverse-based education, training initiatives. This study provided valuable information on tourism students' tendencies to accept metaverse educational technology. The findings provide practical implications for the success of metaverse-based educational applications, and these implications can be considered in line with the existing literature.

The findings highlight the importance of educational institutions providing preparation and training for students to adopt metaverse educational technology more positively. Students should be guided in using this new technology and their perception of ease of use should be increased. Additionally, educators must have the necessary skills to use metaverse training effectively. These results support Rogers' theory of "Innovation Acceptance" (Rogers, 2003). For innovations to be accepted, users must understand how to use these innovations and reap their benefits.

Research findings show that the accessibility of metaverse education technology is important. Educational institutions should develop technical infrastructure and provide students with seamless access to this technology. The reliability and speed of internet connections may affect students' ability to use this technology effectively. Accessibility and technical infrastructure are critical factors for success in online education, with literature addressing barriers to the adoption and use of e-learning applications (Ally, 2004).

Results shows that perceived risk plays a negative role in metaverse training acceptance. Educational institutions must develop strategies to reduce these perceived risks and demonstrate to students that this technology is safe and efficient. These results are consistent with technology acceptance models and risk perception theories (Venkatesh & Bala, 2008). Perceived risk can be a significant barrier to technology acceptance, and therefore reducing risks can increase technology acceptance (Girish et al., 2022; Kim et al., 2022). In conclusion, this study provides concrete practical implications for educational institutions for the successful adoption of metaverse educational technology. These implications can provide important guidance for institutions seeking to promote the use of technology in education.

7.4. Limitations and future research directions

An important limitation is that this study was conducted only with tourism academics who have scientific studies on metaverse and work in Turkey. Therefore, in order to increase the validity and reliability of the results, it is important to expand future research with academics who do not have studies on metaverse and academics working in different countries. In addition, similar studies can be carried out with different stakeholder groups such as sector representatives, tourism entrepreneurs and local authorities. Studies can be carried out to further define and examine the risks that may arise, especially in the metaverse environment. Another limitation of the study includes empirically tested risks. While a general risk is mentioned in this study, it is clear that future studies that include in-depth psychological, social and economic risks are needed. It is clear that there is a need to enrich the knowledge in this field by applying more experimental research methodologies in the future for metaverse technology, which is still in its infancy.

CRediT authorship contribution statement

Suat Akyürek: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing – original draft, Writing – review & editing. **Gökhan Genç:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing – original draft, Writing – review & editing. **İsmail Çalık:** Conceptualization, Data curation, Investigation, Writing – original draft. **Ümit Şengel:** Conceptualization, Data curation, Formal analysis, Investigation, Writing – original draft.

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