

Metaverse in Higher Education: Is it an adaptable immersive space for students and educators?

Amirreza Alizamani

A.Alizamani@sussex.ac.uk

Ph.D. Candidate, Sussex Business School, University of Sussex, Falmer, UK

Mona Rashidirad

M.Rashidirad-702@Kent.ac.uk

Senior lecturer in International Marketing, Kent Business School, University of Kent, Kent,
UK

Abstract

Since technology is advancing in every aspect of our lives, interest in virtual education has begun to grow. One of the technologies that has been in development is Metaverse. However, many educators and students are still unsure of how Metaverse changes the environment of the classroom. Grounded in UTAUT3, this study demonstrates the adaptability of Metaverse as a virtual learning environment for students and educators in UK Higher Education. This study intends to fill in a knowledge gap in developing a more interactive platform than current platforms in Higher Education. Metaverse can help educators develop their pedagogical strategies for their teaching purposes that enhance students' performance and experience. This research will offer policymakers at educational institutions to improve their technological capabilities if they are to support the usage of Metaverse.

Track: 19. Marketing and Retail

1- Introduction

Following the recent technological advances in teaching and learning, the education industry has undergone a transformational shift. The adoption of online learning platforms, such as Moodle, Blackboard, and edX has made asynchronous learning possible for students. By removing physical barriers, online conferencing spaces (e.g., Zoom, WebEx, and Microsoft Teams) helped students and educators engage in synchronous learning. Such technologies have revolutionised students' learning experience and the instructional methods for educators (Kabudi et al., 2021; Papamitsiou & Economides, 2014). Also, the COVID-19 epidemic increased the usage of such resources and technologies at all levels of education, as educators looked for instructional alternatives during the lockdown (Iivari et al., 2020; Pappas & Giannakos, 2021).

Despite the abundance of Internet resources for digital teaching and learning, they have not yet been capable of resembling the actual educational experiences delivered in person in the classroom. The issue of effectively creating virtual learning techniques that would fulfill learning objectives has still to be resolved (Pappas & Giannakos, 2021). According to Badilla et al. (2015), virtual worlds provide three distinguishing features: (i) enhancing understanding rather than using fixed visuals, (ii) a cooperative interaction with certain other people (who are presented as avatars), and (iii) an existing user function through the avatar. Based on much of the study that has been conducted in this area (e.g., Kanematsu et al., 2014; Barry et al., 2015; Sebastien et al., 2018; Liu and Zhang, 2021; Tang, 2021), it is possible to utilise the virtual environment and associated technology in the sphere of education. However, movements, body posture, co-presence, social touch, and involvement that result in a physiological and behavioural experience cannot be transmitted in virtual environments used for educational purposes, hence they are unable to replicate the interaction-based learning process.

The most recent educational disruption (see Pappas & Giannakos, 2021) has highlighted the significance of developing strategies to simulate actual learning experiences in order to address the problems the epidemic has placed on educational systems. The educational transition has been accelerated through such learned lessons, which may also guarantee higher system readiness. With the backing of the Internet of Things (IOT), Artificial Intelligence (AI), blockchain, and machine learning, Metaverse can provide enhanced virtual and augmented reality experiences with the connection between the physical world and the digital environment. Thus, compared to earlier technologies, the application of Metaverse in education can allow higher user interaction, recreate emotional and cognitive processes, and more resembles the total face-to-face classroom experience. The significance of Metaverse in Higher Education looks much more imperative, following the recent COVID-19, when most universities in the world have had to decrease their teaching and learning practices to virtual only.

Thus, in the current climate, it makes sense to use Metaverse technology for virtual instruction. However, it is crucial to enhance the capabilities of Metaverse for educational usage. In recent years, there has been some research on the impact of Virtual Reality (VR) and Augmented Reality (AR) technologies on online courses. However, no study has focused on Metaverse as a place for online learning and teaching. This research examines the factors that influence students' and educators' readiness for virtual classrooms through the application of Metaverse technology in UK Higher Education. So, the research questions are:

Q1. Is Metaverse an adaptable platform for learning and teaching in Higher Education?

Q2. What are the benefits and challenges among students, educators and policy makers to adopt Metaverse as a new virtual platform for learning?

2- Literature review

2-1 Metaverse

The evolution of digital technologies and immersive technologies, such as VR and AR, has had a strong impact on several gestures of communication in the current digitalised world, from talking over the phone, sharing a video message, or simply participating in an online meeting (Cipresso et al., 2018). The creation of hyper-realistic, digital, immersive environments can shape digital twins, virtual twins, and 3D immersive experiences that generate novel interactions between people, technology, and spaces (Prabhakaran et al., 2022). In recent history, several events including the COVID-19 pandemic, allowed different businesses to nurture a silent but constant evolution of immersive technologies which has created a heightened and hyped interest in the community (Jones et al., 2020). With the importance of building, maintaining, and growing meaningful human social connections and interactions, the creation of digital, virtual, and immersive environments, such as Metaverse (Meta, 2021), the omniverse (Nvidia, 2021), or the multiverse (Forbes, 2022), has flourished.

Metaverse refers to a set of digital spaces, including interconnected immersive 3D experiences (Meta, 2022), which allows people to be virtually represented by avatars in a digital environment. In Metaverse, people can connect, socialise, work, and explore scenarios or 3D immersive spaces with others who are not physically present. There are several definitions but also different nuances that currently characterise Metaverse. Metaverse is considered a space that can provide new sensorial experiences by adding new haptic, sensory, and cognitive feedback, which can enhance the current two-dimensional experience with smartphones, tablets, computers, and other mainstream consumer electronics. To highlight the potential of this technology and its applications, recent research (see Gartner, 2022) predicted a massive use of immersive technologies, such as Metaverse by people across the world, and the introduction of new products in Metaverse in the near future.

While the term "Metaverse" was originally used in a Neal Stephenson novel titled "Snow Crash" in 1992 (Joshua, 2017), it has only recently entered the common vernacular of technology critics and academics. According to Joshua (2017), Metaverse is a VR environment that makes use of the Internet and AR through software agents and avatars. Scholars (e.g., Tasa & Go rgülü, 2010; Choi & Kim, 2017; Daz et al., 2020; Koo, 2021; Siyaev & Jo, 2021; Jovanovic & Milosavljevi, 2022) believe that Metaverse has the potential to be used in education in several areas, including language learning, science education, military training, manufacturing training, medical, nursing, and healthcare education. Due to the characteristics of Metaverse, it is anticipated that using Metaverse in education would be different from traditional education based on VR or AR. Metaverse gives students greater opportunities to interact with others, work in various environments and learn and experience new things. By offering opportunities for learning, that would not be available otherwise, Metaverse can expand the types of education. A review of the literature on virtual learning (e.g., López-Belmonte et al., 2022; Yang et al., 2022) reveals that Metaverse has the potential to improve the learning process, and several scholars (e.g., Devisakti & Muftahu, 2022; Gupta et al., 2022) outline its viable strategies.

2-2 Metaverse in education

Metaverse has several potential uses in education where students and educators can interact with others and effectively learn, teach, and experience new things. Even in those circumstances where students may not be able to have the experience that they would have in face-to-face teaching, Metaverse can be used for learning or practice. For instance, while many might not ever have the chance to serve in management positions or to gain flight experience, Metaverse can offer them a platform to learn and experience it (Tasa & Go rgülü, 2010; Koo, 2021; Siyaev & Jo, 2021; Jovanovic & Milosavljevic, 2022). In another example, past research (e.g., Chien et al., 2020) has suggested to place students in VR's authentic surroundings for language acquisition in English as a Foreign Language (EFL) courses. The goal of language learning, however, is to enable EFL learners to have a different life—a living environment where they can use English for working, learning, socialising, and entertainment, just as if they were native English speakers. That is why Metaverse could be highly effective, as it views it as more than a course or a learning activity.

Metaverse in teaching and learning activities can offer several advantages and have a critical impact on the educational process by presenting worthwhile learning possibilities. For example, Metaverse's ongoing technological and cultural developments have the potential to transform both traditional and online learning in novel ways (Abeles, 2007). The ability to construct immersive, adaptable, scalable, diversified, and interactive learning environments with Metaverse can boost students' motivation, active participation, and engagement as well as encourage collaborative and hands-on learning (Tarouco et al., 2013; Vaca Barahona et al., 2016; Diaz, 2020). These environments can also produce high-quality synchronous and learning experiences because they support effective learning, aid in the removal of social and identity barriers, improve students' soft skills (Nurhidayah et al., 2020), creativity (Garcia, 2011), and overall communication and interaction (Vaca Barahona et al., 2016), as well as subject comprehension and academic performance (Garrido-Inigo & Rodriguez-Moreno, 2013; Schaf et al., 2012). It is important to note that even while students may initially have some technological challenges, they are able to quickly become familiar with Metaverse and its different aspects because they are used to using digital devices and media. This along with the fact that Metaverse is game-like (Schaf et al., 2012), gives studies the chance to practice their skills in real-world situations (Schlemmer et al., 2009), and the chance to participate in interactive problem-solving activities (Clark, 2009), are the main reasons why using Metaverse in education is well-received by students.

A whole fresh viewpoint on teaching technology will be made possible by Metaverse (Diaz et al., 2020; Rospigliosi, 2022). For students, it will present fresh learning good fortune, and environments. Numerous teaching and learning initiatives could be accomplished in Metaverse, even if it is impossible to accomplish them in the real world (Siyaev & Jo, 2021). In this new environment, obstacles to learning certain things or developing certain abilities, such as restrictions on time or space or even risks while learning could be overcome (Jeong et al., 2022; Wang et al., 2022). More crucially, with the help of Metaverse's capabilities, reliable teaching courses with strong learning aids can be made available. The scope of the field's research and the number of applications connected to the usage of Metaverse in education are expected to grow significantly over the next decade.

However, whether constructing Metaverse is done for educational or other objectives, there are difficulties (Davis et al., 2009; Falchuk et al., 2018). Along with the inherent ethical concerns, there is now a difficulty with the lack of appropriate technological support (Dionisio et al., 2013).

Table 1: Recent studies in e-learning adoption based on UTAUT Theory

Author(s)	Scope of research	Target group	Model/variable used	Data analysis method	Key finding(s)
Devisakti and Muftahu (2022)	Low-income families in Higher Education institutions	An online survey of 391 Undergraduate students	UTAUT2	Quantitative/Structural Equation Modeling (SEM)	Performance expectancy and facilitating conditions have a significant impact on digital usage.
Gupta et al. (2022)	Virtual communication technology (VCT) adoption among higher educational leaders.	An online survey of 380 educational leaders of India	UTAUT3	Quantitative/SEM	Performance expectancy, effort expectancy, social influence, facilitating conditions and personal innovativeness positively affect on intention to adopt and use VCT.
Tiwari et al. (2021)	Viability of UTAUT3 among educators during COVID-19 towards the use of technology	A survey conducted of 450 educators from Northern India	UTAUT3	Quantitative/SmartPLS-SEM	Performance expectancy, effort expectancy, social influence and personal innovativeness are positively related to the behavioural intention among educators.
Norman Rudhumbu (2021)	Predict blended learning acceptance by students in universities in Zimbabwe	Survey of 432 Postgraduate students from four universities.	UTAUT2	Quantitative/Charted Financial Analyst (CFA)	Performance expectancy, effort expectancy, social influences, facilitating conditions and hedonic motivation significantly and positively influence the behavioural intentions. Habit and price value do not significantly influence university students' behavioural intentions.
Tandon et al. (2021)	Adoption of e-learning for the Undergraduate students of architecture	A survey of 596 architecture undergraduates	UTAUT2	Quantitative/SEM	Except of price value and social influence, other facilitators positively impact on behavioural intention.
Weilage and Stumpfegger (2022)	University educators' acceptance of online teaching	University educators'	UTAUT2	Literature review/quantitative	Performance expectancy ought to be taken into account; Not only a student's own dispositions and abilities, but also the subject matter being taught. Students: evaluations and recognition are the main sources of social

					influence. Hedonic motivation most closely resembles the widely studied idea of intrinsic drive.
Yang et al. (2022)	College students' intentions to use Metaverse technology for learning basketball	An online survey of 1074 college students	Extended UTAUT2	Quantitative/CFA	Habit, attitude, and behavioral intention are the significant predictors of usage behavior. Habit and attitude are also considered important factors for behavioral intention.
Ali Raza et al. (2021)	The determinants that affect students' acceptance and use of Blackboard learning system (BLS) in Pakistan.	A survey of 494 university students	UTAUT2	Quantitative/PLS-SEM	Performance expectancy, social influence, effort expectancy and facilitating condition are the prime determinants influencing the intention, but hedonic motivation and social isolation are not.
Mittal et al. (2021)	Adoption of online teaching among university faculty members	An online survey of 222 university faculty members	UTAUT2 introducing new variables: Regulators Support, Project team support, Facilitating leadership	Quantitative/CFA & SEM	Hedonic motivation, social influence and performance expectancy all surfaced as key factors influencing behavioural intention.
Gunasinghe et al. (2020)	Educators' acceptance towards virtual learning environment	A survey of 441 randomly selected educators	UTAUT3	Quantitative/SEM	Important factors influencing educators' acceptance of virtual learning environments (VLE) are performance expectancy, effort expectancy, facilitating conditions, habit, and hedonic motivation. Social Influence and personal innovativeness, however, did not significantly influence VLE acceptance in the context of the research.
Hu et al. (2020)	Academicians, behavioural intention and use of mobile technology	A survey of 638 faculties of university different departments	UTAUT2	Quantitative/Smart PLS-SEM 3.0	While performance expectancy and hedonic motivation predict educators' behavioural intention and actual use of mobile technologies, social influence, price value and effort expectancy do not. However, facilitating condition is the only external factor that has

					a positive prediction of both academics' behavioural intention and actual usage of mobile technologies. Also, habit is found as the strongest internal predictor.
Nikolopoulou (2020)	University student's acceptance of technology	A survey of 540 university students	Extended UTAUT2	Quantitative/PLS-SEM	Habit (the strongest predictor), performance expectancy and hedonic motivation are the most significant predictors of students' behavioral intention to use mobile phones. Behavioral Intention is the most significant predictor of real mobile phone use. Age, gender and experience had no moderating influence.
Alshehri et al. (2019)	Students' acceptance towards e-learning	A survey of 171 Undergraduate students of different field	Extended UTAUT by adding Technical support (TS)	Quantitative/Smart PLS-SEM 3.0	Performance expectancy, social influence and technical support has a positive impact on behavioural intention. In contrast, facilitating condition and effort expectancy have a negative impact on behavioural intention. Facilitating condition, technical support and behavioural intention significantly affect use behaviour.
Gunasinghe et al. (2019)	Academicians' adoption to e-learning	An online survey of 441 academicians	UTAUT3	Quantitative/SEM	Academicians' adoption of e-learning is significantly influenced by performance expectancy, effort expectancy, facilitating conditions, habits, and hedonic motivation. Social influence and personal innovativeness in IT, however, are not reliable indicators of e-learning.
Handoko (2019)	Behavioural intention of students who take online learning programs	A survey of 365 students	UTAUT with influence of lecturer (IL), quality of service (QoS)	Quantitative/Path analysis	Performance expectancy, effort expectancy, quality of service, and personal innovativeness affects the behavioral intention, while the influence of educator has no effect on behavioral intention. Also, behavioral intention influences use

					behavior while facilitating condition has no effect on use behavior.
Mahande and Malago (2019)	Acceptance of e-learning in Postgraduate program	Ex-post facto approach was used to collect data from 170 people	UTAUT with new variable acceptance of e-learning (AEL)	Quantitative/Path analysis	Facilitating conditions, behavioral intention, effort expectancy, performance expectancy, and social influence significantly and positively affect behavioral intention. Facilitating conditions and behavioral intention significantly and positively affect e-learning acceptance.
Samsudeen and Mohamed (2019)	Investigate the factors that influence the intention and use of e-learning system	A Survey of 15 universities from Undergraduate and Postgraduate students.	UTAUT2	Quantitative/SEM-IBM's SPSS 25 and AMOS 22	Constructs of UTAUT2 play an important role in behavioural intention.
Tey and Moses (2018)	Students' behavioural intention to use technology	A Survey of 699 Undergraduate students in a university in Malaysia	UTAUT with 2 additional variables achievement goal and learning styles	Quantitative/Hierarchical Multiple Regression (HMR)	Effort expectancy, performance expectancy, social influence and achievement goals significantly influence on their behavioural intention to use technology.

Powerful computer gear, quick networks, and a robust authoring system are all required from the standpoint of a Metaverse user (Wiederhold, 2022). Users need affordable, portable technology that enables them to interact with and continuously immerse themselves in high-resolution digital information in Metaverse (Park & Kim, 2022). Even though most individuals still find the expense of the necessary equipment (such as the head mount) to be exorbitant, several businesses are working to create affordable options. It is believed that Metaverse will become more well-known in due course. It is crucial to start thinking about possible learning and curriculum ideas in Metaverse when it comes to education.

A summary of recent studies on students and educators adopting technology based on UTAUT Theory along with their research scope, target group, model, data analysis method, and findings is presented in Table 1. As can be seen in Table 1, 18 studies have been published in the fields of education, e-learning, virtual learning, and online teaching environments, all of which are based on a UTAUT theory. These studies were performed between 2019 and 2023. A critical analysis of the pertinent literature in the field reveals that there are two significant research gaps that this study attempts to fill out.

First, the existing studies have investigated the new technology adoption among either student (e.g., Rudhumbu 2021; Tandon et al. 2021; Yang et al. 2022), or educators/policymakers (e.g.,

Tiwari et al. 2021; Gupta et al. 2022; Weilage and Stumpfegger 2022), and none has studied the relationship between educators and students. Indeed, the current body of research has adopted a limited approach, which is unable to assess the research phenomenon from both parties' perspectives to present a more holistic picture. In order to close this gap, this study decides to reveal this relationship and conduct empirical research on both sides, i.e., students and educators, as the technology adaptation of one party would be pointless without the other one.

Second, A careful literature review (e.g., Crisol-Moya et al., 2020; Diaz, 2020) reveals that Metaverse as a learning environment is still evolving. This is not least because Metaverse research is still in its very early stages with a considerable gap in the body of knowledge- especially in the area of teaching- (Nurhidayah et al., 2020; Park et al., 2021). Apart from only one study by Yang et al. (2022) that looked at Metaverse as a new platform in basketball learning, there is no research to propose Metaverse as a new tool for learning and teaching in educational settings. The extant literature has highlighted this research gap to be investigated by future research in research agendas. In order to fully utilise this new social-economic reality for interaction in managed digital environments that can be tailored to students' requirements, research is crucial (Abeles, 2007; Schlemmer et al., 2009; Schaf et al., 2012; Garri- do-Inigo and Rodriguez-Moreno, 2013; Tarouco et al., 2013).

This study attempts to demonstrate Metaverse as a distinctive and powerful platform for learning and teaching, allowing for customised, immersive, and engaging experiences that can improve learning and teaching outcomes. VR and AR are parts of Metaverse, and some studies (e.g., Hwang and Chien 2022; Yoo et al. 2022; Hines and Netland 2022) have argued about them in this area. As a platform for learning and teaching, Metaverse can be advantageous from the perspective of educators in a number of ways. They contend that the Metaverse supports high participation, group learning, personalised learning, and accessible learning, and it can offer a flexible framework for teaching. This study seeks to explore the interest in Metaverse by looking at how students and educators plan to use technology for learning and teaching in Higher Education.

3- Theoretical framework

Different studies have applied different models/theories to understand the key determinants in the adoption and usability of new technology. Table 2 presents a summary of these theories along with the key constructs investigated.

Table 2: Technology adoption models

Author(s)	Theory/Model	Key constructs
Fishbein and Ajzen (1975)	Theory of reasoned action (TRA)	- Behavioural intention
		- Attitude
		- Subjective norm
Bandura (1977)	Social cognitive theory (SCT)	- Affect
		- Anxiety

Ajzen (1985)	Theory of planned behaviour (TPB)	- Behavioural intention - Attitude - Subjective norm - Perceived behavioural Control
Davis (1989)	Technology acceptance model (TAM)	- Perceived usefulness - Perceived ease-of-use
Thompson et al. (1991)	The model of PC utilisation	- Job fit - Complexity - Long-term consequences - Affect towards use - Social factors - Facilitating condition
Venkatesh et al. (2003)	Unified theory of acceptance and use of technology (UTAUT)	- Performance expectancy - Effort expectancy - Social influence - Facilitating condition
Venkatesh et al. (2012)	Unified theory of acceptance and use of technology 2 (UTAUT2)	- Performance expectancy - Effort expectancy - Social influence - Facilitating condition - Price value - Habit

3-1 UTAUT3 Theory

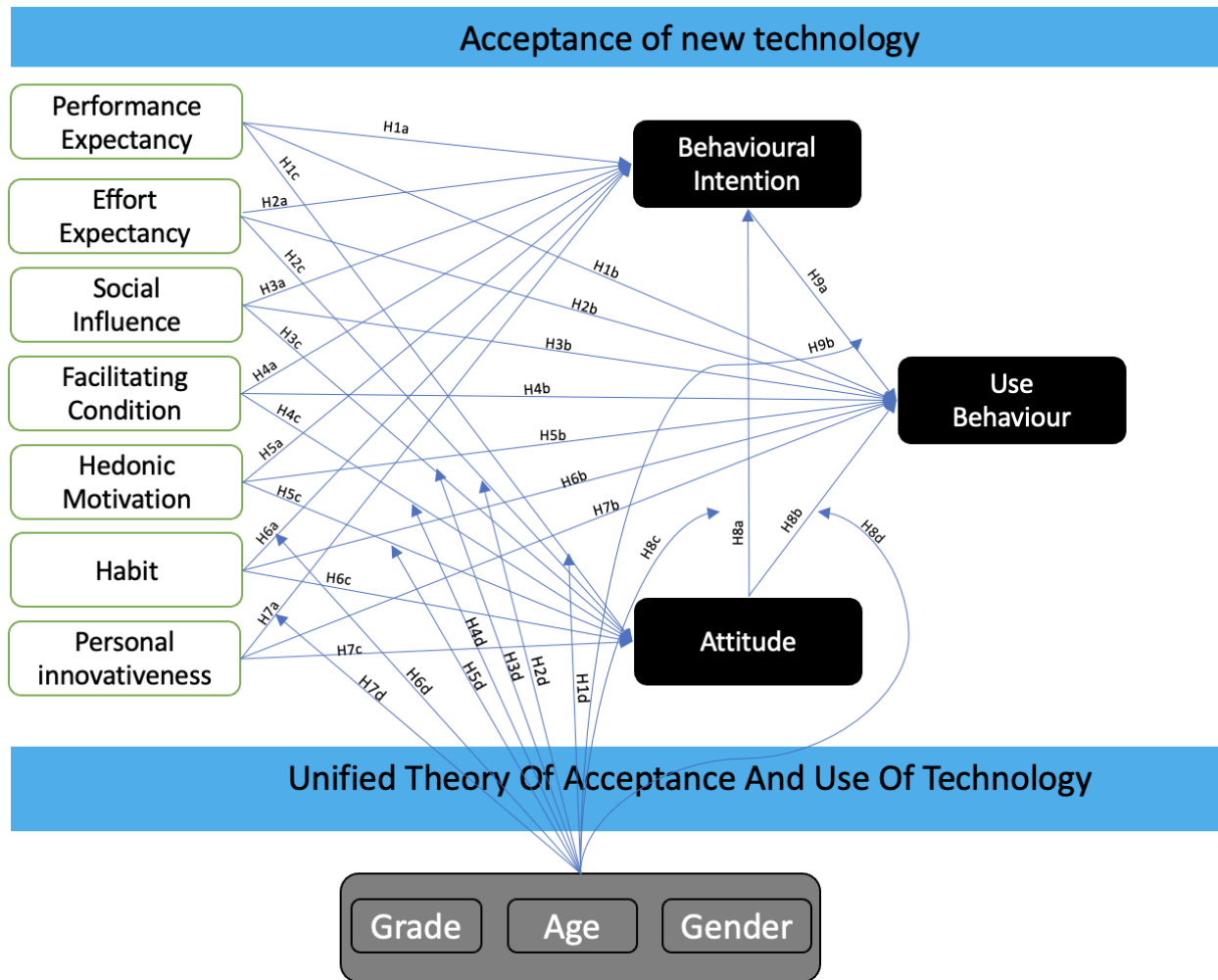
UTAUT framework, introduced by Venkatesh et al. (2003), is a sophisticated and suitable framework for anticipating the adoption of technology and its behavioural intention to use (Jakkaew and Hemrungrrote, 2017; Amadin et al., 2018). The four key dimensions in the UTAUT model are performance expectancy, effort expectancy, facilitating conditions, and social influence which are usually evaluated in relation to moderators, such as age, gender, experience, and voluntariness. UTAUT was then extended to UTAUT2 in the setting of mobile Internet (Venkatesh et al. 2012). In contrast to the earlier UTAUT, which only described 56% variance in behavioural intention and 40% variance in usage, UTAUT2 supported 74% in behavioural intention and 52% in usage. Several scholars (e.g., Rondan et al. 2015; Williams et al. 2015) examine the suitability and applicability of UTAUT2 and put forth that UTAUT2 is a more comprehensive model with higher illustrative power. UTAUT2 was then further developed following a thorough analysis of several technology adoption models (Tamilmani et al., 2021). In addition, Weber (2012) found UTAUT2 as a strong theory in their study of theory evaluation. Venkatesh et al. (2012) added three

more constructs to UTAUT2, including hedonic motivation, price value, and habit. These dimensions were empirically tested and confirmed to be significant by several scholars (e.g., Yasini and Marchand, 2016; Sergueeva et al., 2020), with "habit" appearing to have the greatest influence on intention to use technology (Moorthy et al., 2019).

UTAUT2 has been applied in various fields, including online gaming (e.g., Ramirez-Correa, 2019), mobile banking (e.g., Merhi et al., 2019) e-voting (e.g., Gefen et al., 2005) and more recently in e-learning (e.g., Ali Raza et al. 2021; Mittal et al. 2021, Vladova et al., 2021; Yang et al. 2022). However, there is still a need for systematic research to identify other important factors that could have an impact on the adoption of the consumer technology environment (Venkatesh et al., 2012). The UTAUT2 model was then updated by Farooq et al. (2017), who introduced UTAUT3 with a new independent variable called Personal innovativeness in IT. Farooq et al. (2017) conducted an empirical investigation in the context of educational settings in Malaysia to validate the robustness of the UTAUT3 model. However, there is still not much research carried out to validate UTAUT3 and illustrate its applicability (Gunasinghe et al., 2020). Therefore, this study decides to apply UTAUT3, as the main theoretical foundation as compared to UTAUT, UTAUT3 is much more comprehensive and it can serve as an improved model in terms of variance in behavioural intention and technology use (Tandon et al., 2016; Mittal et al., 2021).

The research framework (see Figure 1) is developed based on UTAUT3 (Venkatesh, et al., 2003). This theory describes how well a new information technology is received (Huang and Kao, 2015). By using this theory, this research can explain students and educators' behaviour of technology acceptance, i.e., Metaverse in Higher Education. As can be seen in this framework, seven independent variables: performance expectancy, effort expectancy, social influence, hedonic motivation, facilitating condition, habit, and personal innovativeness, and behavioural intention and use behaviour are the dependent variables, which are all proposed based on UTAUT3. However, as it can be seen, this study has added an additional variable of attitude to extend UTAUT3 to assess whether the independent variables can play any role in students' and educators' attitudes towards adopting Metaverse. Three key control variables in this study are age, gender, and grade, which have all been considered in past pertinent studies (e.g., Yang et al. 2022; Tiwari et al. 2021).

Figure1: Research framework



3-2 Research hypotheses

3.2.1 Performance expectancy

The degree to which a person is confident that the system being used is helpful to them is referred to as their performance expectancy (Venkatesh et al., 2003). In other words, it refers to how well participants can do activities with the aid of technology (Venkatesh et al., 2012). The degree to which mobile learning services support students' learning activities is referred to as their performance expectancy (Al-Hujran et al., 2014). The performance expectancy gauges how much students think mobile learning may help them succeed academically (Chao, 2019). This has been

proven in the medical area, based on the study by Jahanbakhsh et al. (2018) who showed that a health integration system enhances user performance, work efficiency, and healthcare quality and this, in turn, boosts participants' willingness to utilise the system. This research is going to assess the credibility of this finding in Higher Education. As a result, it may be claimed that:

H1a) Performance expectancy has a favourable impact on behavioural intention of (i) students and (ii) educators in Higher Education using Metaverse.

H1b) Performance expectancy has a favourable impact on user behaviour of (i) students and (ii) educators in Higher Education using Metaverse.

H1c) Performance expectancy has a favourable impact on the attitude of (i) students and (ii) educators in Higher Education using Metaverse.

H1d) (i) Students' and (ii) educators' attitudes regarding performance expectancy using Metaverse are moderated by I) age, II) gender, and III) grade.

3.2.2 Effort expectancy

Effort expectations refer to how simple a new system will be for the users to utilise (Venkatesh et al., 2003). Effort expectancy in older individuals measures how at ease and comfortable they are using Information and Communication Technologies (ICT) (Macedo, 2017). The ease with which students embrace mobile learning services is what is meant by effort expectancy in e-learning (Al-Hujran et al., 2014). The effort expectancy plays a crucial role in the purpose of the client to utilise mobile banking technology because of the specialised knowledge and skills necessary (Alalwan et al., 2016). According to a study on students' readiness to use mobile learning, their social requirements have a favourable influence on how much work they are prepared to put in (Thongsri et al., 2018). As a result, this study puts forth these research hypotheses:

H2a) Effort expectancy has a favourable impact on behavioural intention of (i) students and (ii) educators in Higher Education using Metaverse.

H2b) Effort expectancy has a favourable impact on user behaviour of (i) students and (ii) educators in Higher Education using Metaverse.

H2c) Effort expectancy has a favourable impact on the attitude of (i) students and (ii) educators in Higher Education using Metaverse.

H2d) (i) Students' and (ii) educators' attitudes regarding effort expectancy using Metaverse are moderated by I) age, II) gender, and III) grade.

3.2.3 Social influence

The phrase social influence refers to the extent to which one's environment has an impact on them when they employ the apparatus (Venkatesh et al., 2003). The degree to which students

believe they ought to make use of mobile learning resources that are significant to them is referred to as social influence in the context of mobile learning (Al-Hujran et al., 2014). This social influence could be from their professors, family, friends, etc. In a study by Ahmad and Khalid (2017), it was proposed that social pressure encourages the initial uptake of mobile government services in developing nations. In another study (see Kurfal et al., 2017), social influence was found to have an impact on a participant's propensity to use e-government services. All aforementioned discussion reveals that social influence has a significant impact on participants' behavioural intentions. As a result, it may be claimed that:

H3a) Social influence has a favourable impact on behavioural intention of (i) students and (ii) educators in Higher Education using Metaverse.

H3b) Social influence has a favourable impact on user behaviour of (i) students and (ii) educators in Higher Education using Metaverse.

H3c) Social influence has a favourable impact on the attitude of (i) students and (ii) educators in Higher Education using Metaverse.

H3d) (i) Students' and (ii) educators' attitudes regarding social influence using Metaverse are moderated by I) age, II) gender, and III) grade.

3.2.4 Facilitating condition

Facilitating condition typically refers to a person's level of assurance that equipment and technologies exist and are usable (Venkatesh et al., 2003). The attitudes of students regarding the materials and assistance they will obtain as a result of utilising mobile learning services can be categorised as enabling circumstances (Al-Hujran et al., 2014). As a result, it can be hypothesised that:

H4a) Facilitating condition has a favourable impact on behavioural intention of (i) students and (ii) educators in Higher Education using Metaverse.

H4b) Facilitating condition has a favourable impact on user behaviour of (i) students and (ii) educators in Higher Education using Metaverse.

H4c) Facilitating condition has a favourable impact on the attitude of (i) students and (ii) educators in Higher Education using Metaverse.

H4d) (i) Students' and (ii) educators' attitudes regarding facilitating condition using Metaverse are moderated by I) age, II) gender, and III) grade.

3.2.5 Hedonic motivation

Hedonic motivation is the feeling of joy experienced by a person when using a new technology (Brown and Venkatesh, 2005). Hedonic motivation for offering advertised in social media can affect the consumer's intention to make a purchase (Alalwan 2018) which explains why marketers

develop advertisements in an innovative and creative manner to enhance their inherent effectiveness and interactivity and foster customers' hedonistic incentive (Alalwan, 2018). In this regard, Moriuchi et al. (2021) reveal that apps that incorporate AR are more likely to give users a positive user experience than chatbots. Hedonic motivation has been found as a powerful indicator of people using online banking (Rahi et al., 2018). The participant's purpose is to behave in a way that makes good use of the new technology (Alalwan et al., 2017). Hedonic motivation seeks to instill in individuals a sense of self-fulfillment. Participants can have pleasure utilising the new system (Ramrez-Correa et al., 2019). Tamilmani et al. (2019) extended this line of findings and propose that there is a significant correlation between hedonic motivation and effort expectancy in online learning. Thus, it is expected to find:

H5a) Hedonic motivation has a favourable impact on behavioural intention of (i) students and (ii) educators in Higher Education using Metaverse.

H5b) Hedonic motivation has a favourable impact on the use behaviour of (i) students and (ii) educators in Higher Education using Metaverse.

H5c) Hedonic motivation has a favourable impact on the attitude of (i) students and (ii) educators in Higher Education using Metaverse.

H5d) (i) Students' and (ii) educators' attitudes regarding hedonic motivation using Metaverse are moderated by I) age, II) gender, and III) grade.

3.2.6 *Habit*

The word habit describes a person's active, gradually automated behaviour for learning (Limayem et al., 2007). A person's amount of involvement and familiarity with a technology determines their habitual behaviour, which evolves at various rates throughout time (Venkatesh et al., 2012). The habitual use of smartphones by consumers significantly affects how valuable and user-friendly they are viewed to be (Hubert et al., 2017). Moorthy et al. (2019) put forth that the most significant element affecting accounting students' propensity to embrace mobile learning in Higher Education is a habit. Habit is the main element influencing people's continuing use of mobile applications (Tam et al., 2020). Also, based on a study by Ramrez-Correa et al. (2019), habit is the main reason why people play online games. In this study, it is hypothesised that:

H6a) Habit has a favourable impact on behavioural intention of (i) students and (ii) educators in Higher Education using Metaverse.

H6b) Habit has a favourable impact on user behaviour of (i) students and (ii) educators in Higher Education using Metaverse.

H6c) Habit has a favourable impact on the attitude of (i) students and (ii) educators in Higher Education using Metaverse.

H6d) (i) Students' and (ii) educators' attitudes regarding habit using Metaverse are moderated by I) age, II) gender, and III) grade.

3.2.7 *Personal innovativeness*

Personal innovativeness refers to an extent to which a person is innovative and ready to adopt technological innovation (Radha et al., 2020). The acceptance of technology and Personal innovativeness (PI) are closely related. Numerous scholars have hypothesised that personality characteristics like personal innovativeness make people want to experiment with cutting-edge technology (Dutta et al., 2015; Farooq et al., 2017). Numerous studies have indicated that it affects users' intentions and actual technology use (Dutta et al., 2015; Farooq et al., 2017). According to educators, they must acquire cutting-edge technology and use it to deliver instruction in the classroom and communicate with their peers in an effective manner. Furthermore, effective use of new technology fosters the development of strong e-leadership characteristics. According to Pinho et al. (2021), PI is a consistent and context-specific characteristic that tends to affect how well teaching tools are received and used. Therefore, it is hypothesised as follows:

H7a) Personal innovativeness has a favourable impact on behavioural intention of (i) students and (ii) educators in Higher Education using Metaverse.

H7b) Personal innovativeness has a favourable impact on user behaviour of (i) students and (ii) educators in Higher Education using Metaverse.

H7c) Personal innovativeness has a favourable impact on the attitude of (i) students and (ii) educators in Higher Education using Metaverse.

H7d) (i) Students' and (ii) educators' attitudes regarding personal innovativeness using Metaverse are moderated by I) age, II) gender, and III) grade.

3.2.8 *Attitude*

Psychology and allied fields place a heavy emphasis on attitudes, as any alteration in attitudes results in alterations in behaviour (Howe & Krosnick, 2017). Attitude has a crucial impact on how people perceive emotional risk and what they want to do (Bae & Chang, 2021). Since attitudes are inherently subjective, the degree of certainty attached to them shows the person's assurance and faith in the attitude (Tormala & Rucker, 2018). Consumer attitude of social influence has an impact on how people feel about certain brands (Yang et al., 2017). As a result, it may be claimed that:

H8a) Attitude has a favourable impact on behavioural intention of (i) students and (ii) educators in Higher Education using Metaverse.

H8b) Attitude has a favourable impact on user behaviour of (i) students and (ii) educators in Higher Education using Metaverse.

H8c) Students' and educators' attitude regarding behavioral intention using Metaverse technology is moderated by I) age, II) gender, and III) grade.

H8d) (i) Students' and (ii) educators' attitudes regarding user behavior using Metaverse are moderated by I) age, II) gender, and III) grade.

3.2.9 Behavioural intention

Behavioural Intention is concerned with how the use of online services affects users' behaviour (Kurfal et al., 2017). According to Ramrez-Correa et al. (2019), behavioural intention describes how much a person intentionally plans their future behaviour. Individuals usually base their intentions on their own opinions of usefulness and usability (Ramrez-Correa et al. 2019). Intentions can foretell the degree of acceptance of technology in the future (Szajna, 1996). Salloum et al. (2019) believe that students' favourable attitude when utilising the e-learning system influences their behaviour intention. Social factors have a significant impact on students' behaviour intentions for mobile learning (Briz-Ponce et al., 2017). When utilising new technology in cross-cultural situations, people's habits have an impact on their behaviour intention (Merhi et al., 2019; Nikolopoulou et al., 2020). As a result, it may be claimed that:

H9a) Behavioural intention has a favourable impact on the use behaviour of (i) students and (ii) educators in Higher Education using Metaverse.

H9b) (i) students' and (ii) educators' behavioral intention regarding user behavior using Metaverse is moderated by I) age, II) gender, and III) grade.

4- Methodology

This study seeks to examine the intention of students and educators in Higher Education to use Metaverse as a new platform for learning and teaching.

This study will be conducted quantitatively, and data will be collected through a survey. Using a structured questionnaire, nine proposed hypotheses will be assessed in this research. Students and educators in Higher Education will be the subject of this research. It is expected to have about 75% of the students' sample from Gen Y workers (those born between 1980 and 1997) who would make up the global workforce by 2030 (Montes, 2017). Generation Y has received a lot of credit for being a generation that values independence, openness, curiosity, and instant pleasure.

The approach to assess Metaverse uptake by students in UK Higher Education was developed after a thorough analysis of the literature. To evaluate the implementation of Metaverse in relation to education, no study has been carried out yet. In this study, a conceptual model (see Figure 1) based on UTAUT3 has been developed which consists of ten separate components, i.e., performance expectancy, effort expectancy, social influence hedonic motivation, facilitating condition, habit, personal innovativeness, attitude, behavioural intention, and user behaviour, which describe the readiness to use Metaverse. All research variables will be tested through items which were proposed by previous studies (e.g., Venkatesh et al., 2012; Jiang et al 2022; Lee and Lee 2020).

The questionnaire will be split into two sections, the first of which included questions on demographics including gender, age, and prior experience using virtual learning environments, and the second of which included questions on research variables based on the research framework. Each construct is evaluated on a seven-point Likert scale, with 1 denoting strong disagreement and

7 denoting strong agreement. Participants will be recruited by sending an invitation via emails to take part in a workshop, which is an introduction to Metaverse and how it be applied for teaching and learning in Higher Education. The reason to have a workshop prior to the questionnaire distribution is because Metaverse is still quite new, and participants, both students and educators may not have adequate information about it. Thus, in order to remove any response bias and receive valid responses, participants who would agree to take part in the survey will be invited to attend a workshop to know more about Metaverse and ask any questions they might have. The questionnaire then will be distributed both online and in person to at least 20 universities in the UK. The data will be analysed by statistical methods, e.g., SEM, and path analysis by AMOS to assess each research hypothesis and address the proposed research questions.

5- Expected findings and contributions

In this research, it is expected to find Metaverse as an adoptable platform for learning and teaching in Higher Education. It is anticipated to find out that Metaverse will motivate students to spend their time learning, socialising with other students, and adventure to a new platform, as Metaverse can be developed in many ways to achieve curriculum objectives. Also, one of the other expected findings is to find Metaverse as an effective platform in the Higher Education industry to simulate the real-world learning environment for students and educators. Indeed, Metaverse could improve new teaching and learning methods and go beyond what is possible with e-learning and traditional classroom settings put together.

This study will fill in the knowledge gap regarding how to develop a platform that is more interactive than current platforms in Higher Education to enhance the process of teaching and learning. The results of this research can help both educators and students perform more successfully in the setting of developing technology. As this study will focus on Higher Education in the UK, it can improve the quality of teaching and learning in there that can raise students' satisfaction and their behaviour. Moreover, Metaverse can help educators develop their pedagogical strategies for their teaching purposes that enhance students' performance and experience.

Moreover, this research will offer policymakers at educational institutions to improve their technological capabilities if they are to support the usage of Metaverse in education. For example, policy and decision-makers in Higher Education are suggested to make technical resources (such as VR-head-mounted displays) available to teachers and students to support them with various forms of interactions. This has been acknowledged in the study of Sebastien et al. (2018) who introduce the Immex program, which is made up of various programs, each of which corresponds to a Metaverse university environment. The program consists of the whole experience, internal building experience, and outdoor campus (the outsides and insides of buildings can be visited). However, in addition to having access to the necessary technologies, decision-makers should provide educators with the required training on how to modify their teaching plans to take advantage of these resources.

This study is expected to propose that the successful use of Metaverse would aid academic institutions in resolving some difficulties associated with conventional classroom settings (e.g., time, space, physical and human resources). Through improved monitoring processes and skill development, Metaverse makes it possible to deliver education beyond time and space, which eventually improves the overall quality and organisational efficiency. Therefore, it is advised that when making plans for increased e-learning adoption, university decision-makers consider the

aforementioned propositions. A help desk, e-learning champions, system help options, introduction of policies and guidelines to encourage trial usage and inculcate usage habit through experience, as well as staff training catering to specific departmental needs, building continuous awareness, periodic review of e-learning system, understanding system flaws and improving to be more user friendly, would be all useful in this regard. These actions can encourage a larger academic audience to use Metaverse in Higher Education.

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