The Use of Metaverse for Delivering School Education in the Future in UAE: Advantages and Challenges

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Abstract

The researcher aimed at identifying the advantages of using Metaverse for delivering school education in UAE in the future. He also explored the challenges associated with such use. He used the descriptive analytical and quantitative approaches. He created a survey that consists from four main parts through using Google Form. The validity and reliability of the survey were checked. Then, the link of the survey was uploaded to several Facebook groups. Three hundred twenty seven (327) private school teachers in UAE filled in the survey. Thus, the random sampling method was used. After the use of the SPSS software, results were reached. 84.09% of the respondents support such use of Metaverse. In terms of the advantages associated with such use, it was found that such use of Metaverse shall develop the students' observation, teamwork, analytical thinking and problem solving skills. Such use of Metaverse shall also raise the students' academic achievement levels and extent of retaining information. In terms of the associated challenges, it may make students feel isolated and lonely. It is associated with difficulties in protecting the students' privacy and data security. It shall be associated with difficulty in protecting the students from becoming victims for commercial ads of all kinds.

Keywords: education, meta, verse, Metaverse, UAE, school education, advantages, challenges, Emirati schools

1. Introduction

During the 21st century, many technological developments were developed (Saeed, & Al-Zayed, 2018; Alderbashi, and Tawdrous, 2023). Such technological developments are related to the web, interactive technologies, social media and etc… (Al-Derbashi, & Abed, 2017). They affected various aspects of people's lives (Al-Derbashi, 2017). They include: the emergence of ''Metaverse'' which has been receiving increasing attention by people in all sectors and fields.

Metaverse emerged during the year 1992. It was used at first in a science fiction novel entitled *Snow Crash* that was written by an American novelist named (Neal Stephenson). The characters in *Snow Crash* became avatars and lived in a virtual world that has a three dimensional (3D) nature. This world is called Metaverse (Kye et al., 2021).

Metaverse consists from two main words that are combined together (i.e. meta & verse). Regarding the term "meta", it means virtual and transcendent. As for the term universe, it means world. The term Metaverse can be defined as a virtual reality that exists beyond the existent reality. It can be also defined as a digitized earth that manifests through using digital media. It can be also defined as a 3D-based virtual reality in which daily and economic activities are conducted through the use of avatars who represent the real themselves (Kye et al., 2021).

The term Metaverse can be defined a shared online space that integrates the virtual world with the real one. In other words, it combines the augmented, physical, and virtual realities together. It can be accessed by people through the use of digital identities (Marzaleh et al., 2022). It has infinite potentials. Hence, it can be used for meeting many goals (e.g. economic, educational, and social goals) (Kye et al., 2021).

Metaverse has four types (i.e. augmented reality, mirror world, lifelogging and virtual reality) (Kye et al., 2021). Further data about those types of Metaverse are shown below with offering examples on each type (Petrigna, & Musumeci, 2022):

-Augmented reality: It's a digital graphic environment that represents the existing real world. It uses the real-world setting. It employs lenses, or smartphones. Examples on augmented reality include: Pokemon Go and 3D medical animations.

-Lifelogging: It's an augmentation of the inner word. Through lifelogging, smart devices can be used for recording daily life activities on the web. Examples on Lifelogging include: Facebook, Instagram, Twitter, and etc.. Petrigna, & Musumeci, 2022). Such social media platforms aim to facilitate the social communications between their users (Alderbashi, and Khadragy, 2018)

-A mirror world: It's a simulation of the real world. In this world, the real appearance, information, and structure are transferred to a virtual space. The mirror world allows carrying out activities through mobile applications or internet. Examples on this world include: Google Maps or Earth, educational spaces, like: "digital laboratories". They include: "virtual educational spaces," like: Zoom, Google Meet, Webex, and Teams.

-Virtual reality: It's a virtual online sophisticated three dimensional reality that includes avatars and instant communication instruments which simulate the inner world. Regarding the avatars, they can be personalized. It should be noted that the physical, cultural and social characteristics of the virtual reality differ from the counterpart characteristics of the actual physical reality. In the virtual reality, the avatar are capable of communicating with each other as entities and achieving goals. Examples on virtual reality include: the online multiplayer video games, virtual consultation rooms and virtual hospitals (Petrigna, & Musumeci, 2022). They include: virtual labs (Alderbashi, 2022)

It should be noted that the use of Metaverse for delivering education has many advantages. For instance, such use of Metaverse allows managers in educational institutions to create a virtual replica of their institutions (Contreras et al., 2022) and exchange opinions with each other (Aburayya et al., 2023). It facilitates and supports the social communication between students due to the communication features it offers. It also allows people to enjoy much freedom in creating, sharing and acquiring new experiences through virtualization (Kye et al., 2021). Such experiences are represented in learning in a cyber-physical environment. They are represented in immersive and interactive learning experiences. They shall bridge the gap existing between the conventional classrooms and the modern classroom during the contemporary digital age (Salloum et al., 2023).

Using Metaverse for delivering education contributes to promoting innovation, because it provides users with tools and sensory characteristics that aren't enjoyed in the actual physical reality. It contributes to promoting innovation, because Metaverse allows users to see and visualize things in a three dimensional manner. In addition, Metaverse can be used for teaching various types of courses. The environment of Metaverse can be customized in alignment with the needs of the targeted audience or students. In addition, Metaverse allows students to practice the things they have learnt. It allows students to implement the acquired knowledge, and mimic their instructors' practices to know whether they have understood the targeted information or mastered the targeted skill (Bhugaonkar et al., 2022).

Despite the advantages and benefits of using Metaverse to deliver education, there are several challenges that are associated with such use. Such challenges include: the loopholes that impose data security-related risks. They include: facing difficulties in protecting the uses' privacy and data security. They include: the risk of facing attacks by hackers and having the date stolen or manipulated by a hacker. Other challenges may include: the probability of becoming dependent on using Metaverse or addicted to it. Such dependency or addiction shall negatively affect the mental health of users or students. To illustrate more, using Metaverse may raise the probabilities of suffering from psychosis, schizophrenia, anxiety, depression, or sadness among its users (Bhugaonkar et al., 2022).

Other challenges that are associated with using Metaverse for delivering education include: the need to protect the users from becoming victims for all kinds of commercial ads (Bhugaonkar et al., 2022). They include: the probabilities of becoming addicted to using Metaverse. They include: the need to purchase very expensive equipment by the owners of educational institutions. That may be difficult to do by the educational institutions in developing countries that suffer from poverty and scarcity of the funding sources. Other challenges associated with such use include: the failure of Metaverse to replace real-life practices and face to face interactions. In other words, all people desire to engage in face to face interaction, rather than staying behind the screens for hours in a virtual world. Without having this desire, people would be robots rather than humans! (Bhugaonkar et al., 2022).

There are other challenges associated with using Metaverse for delivering education. Such challenges include: having a debate between various owners of educational institutions about the effectiveness of such use of Metaverse. They include: the possibility of having users violating ethical standards when using Metaverse to commit acts of violence, bullying or other unethical acts. They include: facing a difficulty in protecting Metaverse users from

becoming victims for criminals, like: the criminals of human trafficking or etc. (Marzaleh et al., 2022).

Other challenges associated with such use of Metaverse include: expanding the gaps and increasing the level of inequality between developed and developing countries. That's because many people in developed countries can't use Metaverse, because such use requires receiving training and dedicating much cost for purchasing the required software and hardware (Marzaleh et al., 2022). Other relevant challenges include: the need to have high-speed networks, like 5-g and 6-g which might not be available at the homes of some students (Zhang et al., 2022).

Other relevant challenges include: the need to enrol students in training courses before engaging them in the world of Metaverse. They include: the probability of having students acquiring negative habits due to being influenced by others on Metaverse. They include: the possibility of having negative cultural effects on students due to being influenced by the negative aspects of some cultures (Contreras et al., 2022). They include: having students becoming addicted to the electronic games on Metaverse. Such addiction shall hinder students from learning and concentrating on meeting academic goals (Chen, 2022). Other relevant challenges include: promoting a sense of isolation among students and making some of them feel lonely (Phakamach et al., 2022).

Due to the challenges associated with using Metaverse for delivering education, Aydin (2013) adds that adolescents, teachers and children must have much awareness about the negative effects of using Metaverse on children's skills and people's socializations, and, relationship building skills, and social awareness in the real world. He also adds that the problems associated with using Metaverse for delivering education include: an increase in the probabilities of suffering from game addictions, addiction disorders, cyberbullying, and wellbeing problems, abuse and etc. He also adds that teachers must be aware of the data security, and privacy- related risks associated with using Metaverse (Aydin, 2013).

It should be noted that the use of Metaverse is still in the experimental stage which is a major challenge associated with using it (Bhugaonkar et al., 2022). In addition, there is a lack in the research conducted about using Metaverse in the educational field due to the negative attitudes towards Metaverse, and the lack of references about this technology (Eşin, & Özdemir, 2022). Hence, the researcher of the present study believes that there must be more studies conducted about the advantages of using Metaverse for delivering school education in the future and the challenges associated with such use. He believes that such studies must target the developing countries due to the need to develop their educational systems. Therefore, the problem of this study is represented in identifying the advantages of using Metaverse for delivering school education in UAE in the future and the challenges associated with such use.

1.1 Objectives

In this research article, the researcher aimed at:

a) Identifying whether the teachers in UAE support the use of Metaverse for delivering school education in UAE in the future.

b) Identifying the advantages of using Metaverse for delivering school education in UAE in the future.

c) Identifying the challenges associated with using Metaverse for delivering school education in UAE in the future.

1.2 Questions

The researcher aimed at answering the questions below:

Q.1. Do the teachers in UAE support the use of Metaverse for delivering school education in UAE in the future?

Q.2. What are the advantages of using Metaverse for delivering school education in UAE in the future?

Q.3 What are the challenges associated with using Metaverse for delivering school education in UAE in the future?

1.3 Significance of the Study

This study is significant due to the list of reasons below:

a) As far as the researcher knows, this study is the first study that aimed at identifying the advantages of using Metaverse for delivering school education in UAE in the future. It's the first study that aimed at identifying the challenges associated with such use. Thus, it really fills a gap in the relevant literature.

b) Metaverse is still in the experimental stage as added by Bhugaonkar et al. (2022). Thus, there is a great need for conducting studies about it to identify the effectiveness of using it in the educational field.

c) Book authors and researchers can really benefit from the review of literature presented in this study when writing their books and studies on Metaverse.

d) The results in this study provide decision makers in the ministries in UAE with insights and knowledge about the

effectiveness of using Metaverse for delivering school education in the future. It shall enable those decision makers to make decisions related to the use of Metaverse in the field of education and other fields.

1.4 Limits and Limitations

a) Spatial limits: The present study targets the schools which are located in UAE.

b) Temporal limits: The data in the article was obtained during the year 2023.

c) Human limits: The present study targets the school teachers in UAE

d) Limitations: The results in this article couldn't be generalized, because the results may differ in case the researcher have chosen a different sample size or type. It's also because the results may differ in case the researcher have chosen a different instrument type or content. In addition, the results are affected by the validity and reliability level of the designed instrument.

1.5 Definitions

- Metaverse: (Theoretical definition): The term Metaverse can be defined as a virtual reality that exists beyond the existent reality. It can be also defined as a digitized earth that manifests through using digital media. It can be also defined as a 3D-based virtual reality in which the daily and economic activities are conducted in it through the use of avatars who represent the real themselves. It consists from two main words that are combined together (i.e. meta & verse). Regarding the term "meta", it means virtual and transcendent. As for the term universe, it means world. The term (Metaverse) was used for the first time in 1992 in a novel entitled *Snow Crash* (Kye et al., 2021).

- Metaverse: (Operational definition): It's a three dimensional based virtual reality in which activities are conducted through the use of avatars who represent the real themselves. This world is expressed through using digital media and can be used for the delivery of school education in UAE in the future. The advantages and challenges of using Metaverse for delivering school education in UAE are explored through the survey of this study.

1.6 Theoretical Framework

Using Metaverse for delivering education has numerous advantages. For instance, it allows students to visualize their ideas in a three dimensional (3D) virtual world. It allows instructors to lecture students in this world. It allows students to share academic materials with their colleagues and take tests. It offers students opportunities to interact and communicate effectively with others. In addition, it provides disabled students with effective learning opportunities. It also offers students effective learning opportunities that are characterized with flexibility in terms of time and place. That's because Metaverse can be accessed by students from their own homes. It's also because the Metaverse world can be accessed at the time that suits students (Contreras et al., 2022).

Using Metaverse for delivering education offers students many learning opportunities that are characterized with adaptability. That's because Metaverse allows instructors to design tests, and organize activities that fit with each student based on his/her own talents, strengths, weaknesses, and needs and achievement. Such use of Metaverse allows students to learn through engaging them in educational goal-oriented games. Thus, it makes students perceive the learning process as an enjoyable process rather than a dull process that is based on the lecturing method only. In addition, it allows students to learn about the history and cultures of various nations and countries through visiting various far places and seeing past events virtually. It also allows students to learn about the rules of physics through seeing those rules applied in a three dimensional world and in a practical manner (Contreras et al., 2022).

In addition, Metaverse can be used to promote ethics, and personal and professional values among students instead of promoting such values through lecturing them. It contributes to the development of the somatosensory characteristics of students. Furthermore, it makes it easier for the instructors to monitor and assess students through using auto-correction features (Contreras et al., 2022).

Metaverse allows students to utilize, store and share data during the teaching-learning process. For instance, it allows students to share data about exams, records, and references in a manner that's synchronic, efficient, and accurate (Zhang et al., 2022). It contributes to raising the interests of students in the process of learning through the use of virtual elements. Such elements shall make students motivated to discover things and learn about them. Such use of Metaverse offers personalized teaching models. It also provides students and instructors with realistic three dimensional (3D) identities. It provides students with interactive communication opportunities (Chen, 2022).

The use of Metaverse for meeting educational goals allows simulating high-cost and high-risk scenarios in a secure and virtual manner. Thus, it enables instructors to let students see new things, developments and experiments with ensuring their physical security. It also offers students difficult and complex training repeatedly without facing physical danger.

It allows students to retain the information they acquired for a longer period of time, because the seen and heard information can be retained for a period that's longer than the lectured information (Lee et al., 2022). It contributes to attracting the attention of students, because students are attracted to virtual and interactive elements. It offers students self-learning experiences through allowing them to examine and analyse virtual beings and items by themselves. Thus, it promotes autonomy among students in the learning process (Phakamach et al., 2022).

The use of Metaverse for meeting educational goals provides students with tools for receiving automatic feedback. It allows students to create knowledge by themselves in a creative manner without relying on others. It also contributes to promoting creativity among students, because it allows students to use virtual tools for forming things and doing projects. It allows students to make field trips through the use of 360o degree technology. It allows students to learn and develop their critical thinking skills. That's because Metaverse allows students to analyse the three dimensional virtual environment and examine virtual models and phenomena (Phakamach et al., 2022)

Metaverse allows students to develop their decision making skills. That's because Metaverse allows students to make holistic and timely decisions about the way and time of moving to the next stage or step in a virtual trip, or game. Furthermore, Metaverse contributes to promoting a sense of creativity among learners and serves as a source of inspiration. That is because Metaverse allows students to imagine new uses of the virtual space, and engage in new virtual experiences. It's because seeing others' experiences on Metaverse allows students to create new ideas. It's because Metaverse allows students to contact artists and experts, see monuments, and visit historical sites that may be difficult to visit in the actual world. That shall enable students to see the aesthetic aspects in things (Phakamach et al., 2022).

Metaverse contributes to promoting cross-collaboration among students and developing their teamwork skills. That's because Metaverse allows students to communicate with each other in order to work on group projects. In addition, Metaverse contributes to developing the problem solving skills of students, because it allows students to acquire knowledge, meet experts and work in teams to solve problems. It also allows students to engage in a social-emotional learning process through allowing students to engage in emotional and social experiences. Thus, it allows students to have compassion for others and understand others' emotions and different opinions. That shall lead to improving students' relationships with others (Phakamach et al., 2022).

Metaverse allows students to develop their communication skills. That's because Metaverse allows students to contact their teachers and colleagues during crises and socialize with them. Metaverse also supports the use of the immersive learning approach. It also turns the learning process into an effortless process. It fosters the development of students' analytical thinking skills, because it offers simulation models for beings and phenomena to be analysed by students. It improves students' learning experiences through offering them enjoyable virtual trips and items. It raises the students' extent of retaining information due to providing them with immersive experiences (Phakamach et al., 2022).

Metaverse allows students to learn through observation and practices. It also makes the virtual learning experiences more realistic from the students' perspective. Thus, it develops students' observation skills. It also allows students to see things that may be difficult to see in the mere eye in the actual world (e.g. biological cells and their details). It reduces the risks of suffering from physical injury when learning about dangerous things. For instance, it allows students to see simulation models for explosions, explosive chemical materials and air crash without facing actual physical risks. In addition, it reduces the costs of the resources that are needed in the learning process, like the costs of lab equipment and material. It breaks the temporal and spatial limitations and geographical restrictions that may hinder students from learning. That's because Metaverse allows students to learn at any time and place and visit places that can't be entered by regular people. Such places include: space ships and the places in which Astronauts train (Aydin, 2023).

In addition, Metaverse offers students personalized learning experiences through customizing the academic content and the course plan in accordance with the needs of each student (Lin et al., 2022). It can be used for offering students discussion opportunities which shall increase their interest in the things they are learning about and raise their motivation to learn more. It supports the adoption of a learner-centered approach through allowing students to explore things without relying on others (e.g. instructors or parents). It can be used in the language teaching-learning process for improving the students' proficiency in the foreign or second language. That's because Metaverse offers students opportunities to practice the language with native speakers (Aydin, 2023).

1.7 Previous Studies

Teng et al. (2022) investigated the factors which affect the adoption of a Metaverse platform by students in China. This platform is called (Eduverse). Data was collected from 495 respondents who were students residing in China. A survey

was used for collecting data. It was found that performance expectancy, effort expectancy, social influence, and facilitating conditions significantly and positively affect the satisfaction of learners with using Eduverse. It was found that students' satisfaction had a positive impact on their intention to continue using the latter platform. It was found that the students' intention to use Eduverse is negatively affected by acknowledging the risks associated with such use.

Eşin & Özdemir (2022) aimed to explore the perceptions of math teachers in secondary schools in Turkey towards the use of Metaverse for the delivery of math education. The quantitative and qualitative approaches were adopted. Quantitative and qualitative data were collected. Through conducting interviews and using a survey, seventy (70) secondary school math teachers were sampled from Turkey. It was found that the targeted teachers have positive attitudes towards such use of Metaverse. In addition, Metaverse can be used for teaching concretization and geometry. It was found that gender doesn't affect the perceptions of teachers towards such use of Metaverse.

De Gagne et al. (2022) aimed to explore the effectiveness of using Metaverse for the delivery of education for the students majoring in nursing. They collected data through conducting a meta-analysis and reviewing the relevant literature that were published online between the years (2013-2021). Through reviewing 15 published articles, several results were concluded. For instance, it was found that using Metaverse for the delivery of nursing education contributes to expanding the knowledge of students and raising their levels of self-confidence. In addition, such use of Metaverse raises students' level of engagement in the teaching-learning process. It increase their satisfaction with the teaching-learning process. It leads to raising their academic achievement in the field of nursing.

Rachmadtullah et al. (2023) investigated the attitudes of teachers in elementary schools towards the use of Metaverse technology for learning in Indonesia. They used qualitative and descriptive approaches. Through using a survey, the observation method and conducting interviews, they collected data from twenty (20) elementary school teachers who possessed good skills in using technology. Several findings were reached. For instance, teachers are really interested in using Metaverse as a teaching medium and wishes to use Metaverse in all the lessons. Metaverse assists teachers in teaching students and covering all the academic material. It improves the achievement of students. It allows students to engage in experiences and do activities that may be difficult to do in the actual world. It raises students' interest and curiosity in the learning process. It raises students' engagement in the learning process (Rachmadtullah et al., 2023).

According to Rachmadtullah et al., (2023, Metaverse can be used to channel certain messages for promoting certain attitudes and beliefs. It can stimulate students' thoughts, and direct their feelings. Using Metaverse for delivering education makes the material easier to understand by students. It increases students' engagement in the learning process and motivates students to learn more. It fosters the development of students' critical reasoning and problem solving skills through offering opportunities for collaboration and communication. It contributes to the developing the students' learning techniques. It is deemed practical and flexible. It contributes to eliminating temporal and spatial limitations.

2. Methodology

This part offers data about the study's sample, approach, population, and instrument and its validity and reliability. It offers data about the statistical methods and criteria used in this study.

2.1 Approach

Through adopting the descriptive analytical and quantitative approaches, the researcher collected data about the advantages of using Metaverse for delivering school education in UAE in the future and the associated challenges. According to Vetter (2017), the descriptive analytical approach is used in studies for calculating, describing, and summarizing the collected data in a manner that is meaningful, logical and efficient.

According to Wright et al. (2016), the quantitative approach is adopted by researchers for testing theories. It is adopted for generalizing findings. According to Guetterman et al., (2015), it is adopted for describing phenomena in a statistical manner, or making generalizations. It's also adopted for making causal inferences, or testing theories.

2.2 Population and Sample

The population in the present work involves all the private school teachers in UAE. As for the sample, it is a random sample. To be specific, the researcher uploaded the survey link via Google form to several Facebook groups in order for anyone working as a teacher in UAE to fill in the survey. Three hundred twenty seven (327) teachers filled in the survey. Data about those teachers are shown below

Table 1. Data about the Sample

Variable	Category	Frequency	Percentage (%)
Gender	Male	141	43.11927
	Female	186	56.88073
Academic	BA degree	299	91.43731
qualification	Higher diploma	13	3.975535
	MA degree	9	2.752293
	PhD degree	6	1.834862
	Excellent	88	26.91131
Competency in	Very good	119	36.39144
using technology	Good	66	20.18349
	Fair	36	11.00917
	Poor	18	5.504587

N= 327 teachers

2.3 Instrument

The researcher designed an instrument that's represented in a survey. This survey was designed after reviewing several references. It was designed through using Google Form. It consists from four parts. Its validity and reliability were checked by the researcher. It was uploaded to several Facebook groups. Part one of the survey collected data about the respondents' characterises. Part two collects data about the respondents' support for the use of Metaverse for delivering school education in UAE. Part three collects data about the advantages of such use. As for the fourth part, it collects data about the challenges associated with such use.

The third part was written based on the references published by: Phakamach et al. (2022), Contreras et al. (2022), Bhugaonkar et al. (2022), De Gagne et al. (2022), Rachmadtullah et al. (2023), Aydin (2023), Lin et al. (2022), Lee et al. (2022), and Kye et al. (2021). As for the fourth part, it was written based on the references published by: Bhugaonkar et al. (2022), Marzaleh et al. (2022), Phakamach et al. (2022), and Contreras et al. (2022).

2.4 The Instrument's Validity

The researcher passed the instrument (i.e. the survey) in its initial version to two individuals working as university instructors in UAE. The latter instructors were asked to conduct an assessment for the instrument in terms of clarity, content and language. They were asked to check the relevancy of the instrument to the pre-set objectives of the study. They were asked to make the needed changes and corrections to the instrument. After assessing the survey, they added that the instrument is free from language-related errors. They added that the instrument is clear, and able to meet the pre-set objectives of the study. They added that the instrument was written and designed based on scientific criteria.

2.5 The Instrument's Reliability

The Cronbach alpha value was calculated. That was done because the latter value represents the reliability level of the instrument. This value is 0.896. It is considered high due to being greater than 0.70 as it was added by Salehi & Farhang (2019).

2.6 Statistical Analysis Methods

The SPSS program was used to analyse the data that was collected from the chosen students. In addition to using this program, the following statistical methods were also used:

- Arithmetic means & standard deviations were calculated

- Frequencies & percentages were calculated

- The value of the Cronbach alpha coefficient was calculated

For classifying the calculated means, the criteria displayed below were adopted (Alderbashi, 2021)

Table 2. The Criteria That Was Adopted for Having the Calculated Means Classified into Three Categories

Range	Level	Attitude
2.33 or less	Low	Negative
2.34-3.66	Moderate	Neutral
3.67 or more	High	Positive

*Source: Alderbashi (2021)

The five point Likert scale was used in the survey. It includes 5 main categories for rating the attitude. Those categories are displayed below (Al-Derbashi and Moussa, 2022)

Table 3. The Categories and Scores of the Likert Scale Used in This Research

Category	Score
Strongly agree	5
Agree	4
Neutral	3
Disagree	2
Strongly disagree	1

*Source: Al-Derbashi and Moussa (2022)

3. Discussion and Results

3.1 First Question

Q.1) Do the teachers in UAE support the use of Metaverse for delivering school education in UAE in the future?

Table 4. The Percentages and Frequencies of the Support of Teachers in UAE for the Use of Metaverse for Delivering School Education in the Future in UAE

Variable	Category	Frequency	Percentage (%)
Do you support the use of Metaverse for delivering school education in UAE in the future?	Yes	275	84.0978593
	No	50	15.2905199
	I don't know	2	0.6116208

N= 327

84.09 % of the respondents support the use of Metaverse for delivering school education in UAE in the future. The stand of the latter respondents may be attributed to the fact that Metaverse offers flexible and personalized learning opportunities that aren't available in the conventional teaching-learning mode (i.e. in the real world learning environment). For instance, Metaverse allows students to travel and visit dangerous places, like: the places of volcanos. However, 15.29% of the respondents don't support such use of Metaverse. The stand of the latter respondents may be attributed to the fact that the use of Metaverse requires paying millions of dollars to purchase the required hardware and software. It may be attributed to the need to enrol students and instructors in numerous training courses about Metaverse before using it in the educational field. 0.61 % of the respondents didn't express their stand on such use. That may be attributed to the fact that Metaverse is still in the experimental stage.

The result in this regard is in agreement with the result reached by Eşin & Özdemir (2022). The latter researchers found that the math teachers in Turkish secondary schools have positive attitudes towards the use of Metaverse for the delivery of math education.

3.2 Second Question

Q.2 What are the advantages of using Metaverse for delivering school education in UAE in the future?

To identify such advantages, means along with standard deviations were calculated. Those standard deviations and means are displayed below in table (5):

Table 5. The Advantages of Using Metaverse for Delivering School Education in UAE in the Future

No.	Statement	Mean	Std.	Level	Attitude
The use of Metaverse for delivering school education in UAE in the future					
1.	shall promote creativity among students	4.602446	0.33	High	Positive
2.	shall make the learning process enjoyable	4.587156	0.86	High	Positive
3.	shall positively affect the social communication between students	2.06422	0.12	Low	Negative
4.	shall contribute to meeting the learning needs of students	4.663609	0.83	High	Positive
5.	shall increase the students' engagement in the learning process	4.357798	0.59	High	Positive
6.	is suitable for all courses	2.262997	0.28	Low	Negative
7.	Is suitable for all disabled students regardless of their disability type and severity	0.412844	0.48	Low	Negative
8.	shall motivate students to learn	4.434251	0.75	High	Positive
9.	shall make the academic material easier to understand by students	4.755352	0.19	High	Positive
10.	shall contribute to raising the students' levels of self-confidence	2.003058	0.52	Low	Negative
11.	shall develop the students' skills in observation	4.801223	0.60	High	Positive
12.	shall develop the students' teamwork skills	4.724771	0.35	High	Positive
13.	shall develop the students' critical reasoning skills	4.847095	0.72	High	Positive
14.	shall develop the students' analytical thinking skills	4.69419	0.65	High	Positive
15.	shall develop the students' skills in solving problems	4.281346	0.24	High	Positive
16.	shall develop the students' decision making skills	2.324159	0.46	Low	Negative
17.	shall raise the students' level of information retention	4.510703	0.90	High	Positive
18.	shall raise the students' academic achievement level	4.862385	0.27	High	Positive
19.	shall increase the students' satisfaction with the teaching-learning process	4.235474	0.69	High	Positive
20.	shall expand the students' amount of knowledge	4.969419	0.40	High	Positive
21.	shall promote autonomy in learning among students	4.908257	0.71	High	Positive
22.	shall facilitate the process of assessing students	4.923547	0.36	High	Positive
23.	is effective for promoting ethics and positive values among students	4.159021	0.57	High	Positive
24.	shall provide students with distinguished learning experiences	4.938838	0.39	High	Positive
	Overall	4.05	0.51	High	Positive

It was found that the respondents have positive attitudes towards using Metaverse for delivering school education in UAE. That's because the overall mean is 4.05. This result may be attributed to the fact that such use of Metaverse is characterized with flexibility and adaptability. It was found that such use of Metaverse promotes creativity among students, because the mean of item 1 is 4.60. This result is consistent with the one reached by Phakamach et al. (2022). It can be attributed to the fact that Metaverse provides students with virtual tools that allow them to show and develop their creative potentials, such as: drawing skills.

It was found that such use of Metaverse makes learning enjoyable, because the mean of item 2 is 4.58. This result is consistent with the one reached by Contreras et al. (2022). It can be attributed to the fact that Metaverse provides students with games, and allows them to make virtual trips and experiments. That shall make their virtual learning experiences interactive and more realistic. In this manner, students shall enjoy their learning experiences.

It was found that such use of Metaverse contributes to meeting the learning needs of students, because the mean of item 4 is 4.66. This result is consistent with the one reached by Bhugaonkar et al. (2022) and Contreras et al. (2022). It can be attributed to the fact that the Metaverse environment and activities can be designed in a customized manner that's based on the learning needs, strengths and weaknesses of students.

It was found that such use of Metaverse contributes to increasing the students' engagement in the learning process, because the mean of item 5 is 4.35. This result is consistent with the one reached by De Gagne et al. (2022 and Rachmadtullah et al. (2023). It can be attributed to the fact that the three dimensional nature of Metaverse makes students feel motivated to engage in the learning process. It was found that such use of Metaverse motivates students to

learn, because the mean of item 8 is 4.43. This result is consistent with the one reached by Aydin (2023). It can be attributed to the fact that students feel motivated to learn when using any modern technology and carrying out virtual activities and trips.

It was found that such use of Metaverse makes the material easier to understand by students, because the mean of item 9 is 4.75. This result is consistent with the one reached by Rachmadtullah et al. (2023). It can be attributed to the fact that Metaverse allows students to see practical examples for knowledge in a three-dimensional manner. It can be attributed to the fact that Metaverse allows students to see the items and operations mentioned in the curricula virtually. It was found that such use of Metaverse shall develop the students' skills in observation, because the mean of item 11 is 4.801. This result is consistent with the one reached by Lin et al. (2022). It can be attributed to the fact that Metaverse allows students to observe the Metaverse environment and several natural phenomena that may be difficult to observe in real world. Such phenomena include: volcanic eruption.

It was found that such use of Metaverse shall develop the students' teamwork skills, because the mean of item 12 is 4.72. This result is consistent with the one reached by Phakamach et al. (2022). It can be attributed to the fact that Metaverse allows students to work on group projects and cooperate with each other. It was found that such use of Metaverse shall develop the students' critical reasoning skills, because the mean of item 13 is 4.84. This result is consistent with the one reached by Rachmadtullah et al. (2023). It can be attributed to the fact that Metaverse offers students opportunities to analyse, interpret, conceptualize, and explain things and phenomena and assess situations.

It was found that such use of Metaverse shall develop the students' skills in solving problems, because the mean of item 15 is 4.28. This result is consistent with the one reached by Phakamach et al. (2022). It can be attributed to the fact that Metaverse presents potential problems to students in order to solve them. It was found that such use of Metaverse shall raise the students' extent of retaining information because the mean of item 17 is 4.51. This result is consistent with the one reached by Lee et al. (2022). It can be attributed to the fact that Metaverse allows students to see practical examples and simulation models for knowledge. In other words, acquiring knowledge visually contributes to retaining it for longer period of time.

It was found that such use of Metaverse shall raise the students' academic achievement levels, because the mean of item 18 is 4.86. This result is consistent with the one reached by De Gagne et al. (2022). It can be attributed to the fact that Metaverse allows students to contact researchers, experts, and teachers to acquire knowledge directly from. It can be attributed to the fact that Metaverse allows students to make virtual meetings with their colleagues for acquiring knowledge from them.

It was found that such use of Metaverse shall increase the students' satisfaction with the teaching-learning process because the mean of item 19 is 4.23. This result is consistent with the one reached by De Gagne et al. (2022). It can be attributed to the fact that Metaverse turns the learning process into a process that's based on virtual experiences and examples rather than being a process that's based on the lecturing method. That shall make students feel highly satisfied with the strategies used for teaching them.

It was found that such use of Metaverse shall expand the students' amount of knowledge, because the mean of item 20 is 4.96. This result is consistent with the one reached by De Gagne et al. (2022). That's because Metaverse allows each student to access virtual libraries and read books. It was concluded that such use of Metaverse shall promote autonomy in learning among students, because the mean of item 21 is 4.90. This result is consistent with the one reached by Phakamach et al. (2022). It can be attributed to the fact that Metaverse allows students to implement the information they learnt, conduct experiments and apply theories by themselves without relying on their teacher or anyone else.

It was found that such use of Metaverse shall facilitate the process of assessing students, because the mean of item 22 is 4.92. This result is consistent with the one reached by Contreras et al. (2022). It can be attributed to the fact that Metaverse allows teachers to assess students through assigning virtual projects, and presentation assignments to them. It was found that such use of Metaverse is effective for promoting ethics and positive values among students because the mean of item 23 is 4.15. This result is consistent with the one reached by Contreras et al. (2022). That's because Metaverse allows teachers to present sketches about the consequence of the absence of values and ethics in society.

However, it was found that such use of Metaverse shall negatively affect the social communication between students, because the mean of item 3 is 2.06. This result isn't in agreement with the one found by Kye et al. (2021). It can be attributed to the absence of face to face social interaction and body language. Due to such absence, students won't be capable of developing their social skills effectively like they do in the real life educational environment.

It was found that such use of Metaverse is not suitable for all the courses, because the mean of item 6 is 2.26. This result isn't in agreement with the one found by Bhugaonkar et al (2022). It can be attributed to the fact that teaching

some courses requires seeing students practicing practical skills in the real environment. Such courses include: music, acting and sculpture courses.

It was found that such use of Metaverse doesn't suit all disabled students regardless of their disability type and severity, because the mean of item 7 is 0.41. This result isn't in agreement with the one found by Contreras et al. (2022). It can be attributed to the fact that Metaverse doesn't suit the students suffering from autism, visual disabilities or major intellectual disabilities. Thus, the use of Metaverse for teaching the latter students won't be a good choice. It was found that such use of Metaverse shall not develop the students' decision making skills, because the mean of item 16 is 2.32. This result isn't in agreement with the one found by Phakamach et al. (2022). It can be attributed to the fact that developing decision making skills requires providing students with special courses that target the latter skills.

3.3 Third Question

Q.3 What are the challenges associated with using Metaverse for delivering school education in UAE in the future?

To identify such challenges, means along with standard deviations are calculated. Those standard deviations and means are identified through the table below

Table 6. The Challenges Associated with Using Metaverse for Delivering School Education in UAE in the Future

No.	Statement	Mean	Std.	Level	Attitude
1.	It's difficult to dedicate the cost needed for the use of Metaverse for delivering school education in UAE in the future	1.972477	0.27	Low	Negative
2.	It's difficult to develop the IT infrastructure needed for the use of Metaverse for delivering school education in UAE in the future	1.896024	0.35	Low	Negative
The use of Metaverse for delivering school education in UAE in the future					
3.	shall be associated with difficulty in protecting the students' data security	4.740061	0.79	High	Positive
4.	shall be associated with difficulty in protecting the students' privacy	4.678899	0.41	High	Positive
5.	shall be associated with difficulty in protecting students from becoming victims for criminals	4.571865	0.67	High	Positive
6.	shall be associated with difficulty in preventing students from committing unethical acts on Metaverse, like: verbal violence	4.617737	0.52	High	Positive
7.	shall increase the probabilities of having students becoming addicted to games	4.464832	0.36	High	Positive
8.	shall increase the probabilities of having students becoming addicted to using Metaverse	4.41896	0.54	High	Positive
9.	shall be associated with difficulty in protecting the students from becoming victims for commercial ads of all kinds	4.770642	0.81	High	Positive
10.	shall be associated with difficulty in protecting students from acquiring negative habits	4.831804	0.46	High	Positive
11.	shall make students feel isolated and lonely	4.892966	0.82	High	Positive
12.	shall negatively affect the students' relationship building skills	4.954128	0.47	High	Positive
13.	shall have negative cultural effects	4.327217	0.83	High	Positive
	Overall	4.24	0.56	High	Positive

Based on the above table, the severity of the challenges associated with using Metaverse for delivering school education in UAE in the future is deemed high, because the overall mean is 4.24. This result can be attributed to the fact

that Metaverse is still a new technology that is in the experimental stage. It's also attributed to the fact that using Metaverse requires exerting much effort by programmers to protect its users and students from the risks associated with using it.

It was found that such use of Metaverse shall be associated with difficulty in protecting the students' data security and privacy, because the means of statement No. 3 and No. 4 are 4.74 and 4.67 respectively. This result is consistent with the one found by Bhugaonkar et al. (2022). It can be attributed to the fact that using any type of technology is always associated with the risk of facing attacks by hackers.

It was found that such use of Metaverse shall be associated with difficulty in protecting students from becoming victims for criminals because the mean of statement 5 is 4.57. This result is consistent with the one found by Marzaleh et al. (2022). It can be attributed to the fact that parents and teachers can't enforce full control and supervision on students when using Metaverse. Thus, students may interact with criminals on the web while using Metaverse.

It was found that such use of Metaverse shall be associated with difficulty in preventing students from committing unethical acts on Metaverse. That's because the mean of statement 6 is 4.61. This result is consistent with the one found by Marzaleh et al. (2022). It can be attributed to the fact that the use of technology facilitates the commitment of acts of plagiarism, verbal bullying, cheating and etc.. It can be attributed to facing difficulty in enforcing full supervision on the students using Metaverse.

It was found that such use of Metaverse shall increase the probabilities of having students becoming addicted to games, because the mean of statement 7 is 4.46. This result is consistent with the one found by Phakamach et al. (2022). It can be attributed to the fact that the use of e-games with interactive features shall increase the probabilities of having students becoming addicted to playing those games.

It was found that such use of Metaverse shall increase the probabilities of having students becoming addicted to using Metaverse, because the mean of statement 8 is 4.41. This result is consistent with the one found by Bhugaonkar et al. (2022). It's attributed to the fact that children love using interactive technologies in order to play games and interact with their friends in a virtual world.

It was found that such use of Metaverse shall be associated with difficulty in protecting the students from becoming victims of commercial ads of all kinds because the mean of statement 9 is 4.77. This result is consistent with the one found by Bhugaonkar et al. (2022). It can be attributed to the fact that some companies make ads for prestigious and expensive products which can be bought and used only by rich users of Metaverse. However, some students may exaggerate in buying such expensive on Metaverse. That may make those students addicted to shopping.

It was found that such use of Metaverse shall be associated with difficulty in protecting students from acquiring negative habits, because the mean of statement 10 is 4.83. This result is consistent with the one found by Contreras et al. (2022). It can be attributed to the fact that the use of Metaverse may make some students use this technology for many hours and staying up late to use this technology. It can be attributed to the fact that some students may develop negative eating habits due to eating while using this technology.

It was found that such use of Metaverse shall make students feel isolated and lonely, because the mean of statement 11 is 4.89. This result is consistent with the one found by Phakamach et al. (2022). It can be attributed to the fact that the use of Metaverse shall reduce the extent of having face to face interaction with others. Thus, students may start feeling lonely after using it for a while. In other words, face to face interaction should not be eliminated when using Metaverse in any educational institution, because such an interaction meets the psychological and social needs of students.

It was found that such use of Metaverse shall negatively affect the students' relationship building skills because the mean of statement 12 is 4.95. This result is consistent with the one found by Aydin (2013). It can be attributed to the fact that the elimination of face to face interaction when using Metaverse in schools shall negatively affect the ability of students to make relationships and keep them. It was found that such use of Metaverse shall have negative cultural effects because the mean of statement 13 is 4.32. This result is consistent with the one found by Phakamach et al. (2022). It can be attributed to the fact that Metaverse may be used by some people for promoting negative ideas about certain cultures. When students read such ideas, they may believe them and acquire negative attitudes towards those cultures.

However, it was found that it is not difficult to dedicate the cost needed for the use of Metaverse for delivering school education in UAE in the future, because the mean of statement 1 is 1.972. This result isn't consistent with the one found by Marzaleh et al. (2022). It may be attributed to the fact that the UAE government is capable of dedicating much money to purchasing the needed hardware and software and training students and teachers about the way of

using Metaverse.

It was found that it is not difficult to develop the IT infrastructure needed for the use of Metaverse for delivering school education in UAE in the future, because the mean of statement 2 is 1.89. This result can be attributed to the fact that the UAE government is capable of dedicating funds and recruiting experts for developing such an infrastructure.

4. Conclusion and Recommendations

After the use of the SPSS software, several results were reached. For instance, 84.09 % of the respondents support the use of Metaverse for delivering school education in UAE in the future. It was found that there are several advantages for such use of Metaverse. Such advantages include: the development of the students' observation, teamwork, critical reasoning, analytical thinking and problem solving skills. They include: raising students' academic achievement and extent of retaining information.

It was found that there are several challenges associated with such use of Metaverse. For instance, such use shall make students feel isolated and lonely. It shall be associated with difficulties in protecting students' privacy and data security. It shall increase the probabilities of having students becoming addicted to games and Metaverse. It shall be associated with difficulty in protecting students from acquiring negative habits. It shall have negative cultural habits. It shall be associated with difficulty in protecting the students from becoming victims for commercial ads of all kinds.

The results in this study support the effectiveness of using Metaverse for delivering education. Based on such results, the researcher believes that Metaverse could be used effectively in the future in many universities and schools along with employing the face-to-face educational mode.

The results also suggest that several challenges hinder such use of Metaverse. That means that counselling programs must be developed and implemented when using Metaverse in the educational system. Such programs must aim at protecting students from becoming victims for commercial ads, and committing unethical acts. They must aim at developing the students' relationship building skills.

In the light of the results, the researcher recommends:

- Conducting studies about the advantages of using Metaverse for the delivery of university education in UAE and the challenges associated with such use.

- Conducting studies about the effectiveness of using Metaverse for the delivery of university education with targeting several majors (e.g. engineering, medicine, nursing, or etc..) .

- Developing the IT infrastructure by the governments of developing countries to use modern technologies for delivering education to students in those countries.

- Dedicating funds for supporting the use of advanced technologies in the educational institutions in all the developing countries. That shall foster the developments of those countries in all the areas and improve the quality of the education they deliver.

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Appendix:

A Questionnaire

Hello,

I am Dr. Khaled Younis Alderbashi; a faculty member City University Ajman in UAE. I designed the present survey in the aim of collecting data for conducting a study about Metaverse. This study is titled (The Use of Metaverse for Delivering School Education in the Future in UAE: Advantages and Challenges). It aims to identify the advantages of using Metaverse for delivering school education in UAE in the future and the challenges associated with such use.

The term "Metaverse" can be defined as a shared online space that integrates the virtual world with the real one. In other words, it combines the augmented, physical, and virtual realities together. It can be accessed by people through the use of digital identities (Marzaleh et al(Note 1)., 2022). It can be also defined as a 3D-based virtual reality in which daily and economic activities are carried out through the use of avatars who represent the real themselves (Kye et al., 2021 (Note 2)).

In order to assist me in conducting this study, please, read the present survey carefully and then, answer the items honestly

Part one:

a) I am a:

- female

- male

b) I have

-BA degree

-Higher Diploma

-MA degree

-PhD degree

c) My competency in using technology is considered

- Excellent

- Very good

- Good

- Fair

- Poor

Notes

Note 1. Marzaleh¸ A., Peyravi, M., & Shaygani, F. (2022). A revolution in health: Opportunities and challenges of the Metaverse. *EXCLI Journal*, *21*, 791-792. https://doi.org/10.17179/excli2022-5017

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Part two:

Do you support the use of Metaverse for delivering school education in UAE in the future?

a) Yes

b) No

c) I don't know

Part three:

Please, answer the items below

No.	Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
The use of Metaverse for delivering school education in UAE in the future						
1.	shall promote creativity among students					
2.	shall make the learning process enjoyable					
3.	shall positively affect the social communication between students					
4.	shall contribute to meeting the learning needs of students					
5.	shall increase the students' engagement in the learning process					
6.	is suitable for all courses					
7.	Is suitable for all disabled students regardless of their disability type and severity					
8.	shall motivate students to learn					
9.	shall make the academic material easier to understand by students					
10.	shall contribute to raising the students' levels of self-confidence					
11.	shall develop the students' skills in observation					
12.	shall develop the students' teamwork skills					
13.	shall develop the students' critical reasoning skills					
14.	shall develop the students' analytical thinking skills					
15.	shall develop the students' skills in solving problems					
16.	shall develop the students' decision making skills					
17.	shall raise the students' level of information retention					
18.	shall raise the students' academic achievement level					
19.	shall increase the students' satisfaction with the teaching-learning process					
20.	shall expand the students' amount of knowledge					
21.	shall promote autonomy in learning among students					
22.	shall facilitate the process of assessing students					
23.	is effective for promoting ethics and positive values among students					
24.	shall provide students with distinguished learning experiences					

Part four:

Please, answer the items below

No.	Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1.	It's difficult to dedicate the cost needed for the use of Metaverse for delivering school education in UAE in the future					
2.	It's difficult to develop the IT infrastructure needed for the use of Metaverse for delivering school education in UAE in the future					
The use of Metaverse for delivering school education in UAE in the future						
3.	shall be associated with difficulty in protecting the students' data security					
4.	shall be associated with difficulty in protecting the students' privacy					
5.	shall be associated with difficulty in protecting students from becoming victims for criminals					
6.	shall be associated with difficulty in preventing students from committing unethical acts on Metaverse, like: verbal violence, and bullying					
7.	shall increase the probabilities of having students becoming addicted to games					
8.	shall increase the probabilities of having students becoming addicted to using Metaverse					
9.	shall be associated with difficulty in protecting the students from becoming victims for commercial ads of all kinds					
10.	shall be associated with difficulty in protecting students from acquiring negative habits					
11.	shall make students feel isolated and lonely					
12.	shall negatively affect the students' relationship building skills					
13.	shall have negative cultural effects					

Thanks for showing cooperation and filling in the present survey ☺

Competing interests

The author of this work declares that he doesn't have any competing financial interest nor personal relationships that may have influence this work.

Informed consent

The verbal consents of the respondents were obtained by the researcher.

Ethics approval

The Publication Ethics Committee of the Sciedu Press.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

Open access

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