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Teachers' Opinions on the Use of Metaverse

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Abstract

This study is aimed to explore the opinions of teachers about the use of Metaverse in an educational environment. Several questions will be answered regarding the use of metaverse in the classroom by teachers such as their understanding of metaverse and their confidence in utilizing it in the classroom. The study group of the research consists of 11 teachers who are teaching in one of the central secondary schools of SAKARYA province in 2022, determined by the convenience sampling method, which is one of the purposive sampling method. The reason for choosing this study group is that the sample is near the researcher and easy to reach, thus giving speed and practice for the research. In order to prevent the identity of the teachers in the research group from being known, and in accordance with the ethical rules, the teachers were assigned numbers such as Ö1, Ö2, Ö3, Ö4, Ö4, Ö5, Ö6, Ö7, Ö8, Ö9, Ö10, Ö11. A case study, one of the qualitative research methods, was used as the research model. In the study, the analysis of the interview data was made using the content analysis method. It was concluded that the teachers had heard about the concept of metaverse only recently, their self-efficacy in using metaverse varied, and had different applications of metaverse in the learning environment.

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INTRODUCTION

Recent developments and innovations in technology have changed and enriched human interaction, communication and social functions (Mystakidis, 2021), making it necessary for people to move their lifestyles to virtual environments. Within all this change, it has become inevitable to transfer educational processes to these virtual environments. In these environments, students find the opportunity to realize many educational activities that are difficult and dangerous to do in real life by taking on a virtual identity and body (Ertürk and Şahin, 2019).

Virtual environments, also called virtual reality, are "a three-dimensional computer simulation that makes us feel like being anywhere and provides various information (light, sound and others) to our sensory organs" (Çavaş, et al.; 2004). In other words, virtual reality is a three-dimensional simulation environment that creates a sense of being in another environment through computers, head-mounted viewers and a cabin environment (Kaleci, Tepe and Tüzün; 2017).

When we look at the features of virtual reality environments used in education; providing interaction, collecting the student's attention fully, narrative flexibility, being experiential and giving importance to the senses (Çavaş et al., 2004) together with these features these environments increase the willingness of students towards the lesson, provide permanent learning, and make learning effective and interesting. Therefore, it has been concluded that high levels of success are achieved. Virtual reality also facilitates orientation activities, can be used in foreign language education, creates opportunities to realize many teaching methods and techniques, improves problem solving skills and provides high-level learning experiences (Ertürk and Şahin, 2019). Metaverse is considered to be the first iteration of a network of virtual worlds where avatars could teleport between them. The contemporary iteration of the metaverse includes social, immersive VR platforms compatible with massively multiplayer online video games, open game worlds and AR co-working spaces (Mystakidis, 2022).

Metaverse, is a closed compound word with two components: Meta (Greek prefix meaning post, after or beyond) and universe. In other words, the Metaverse is a post-reality universe, a permanent and persistent multi-user environment that combines physical reality with digital virtuality. In relation to online distance learning, the Metaverse has the potential to address the main limitations of web-based 2D e-learning tools. Education is a crucial area for society and economy where the basic methods of implementation remain unchanged and revolve around content transfer, classrooms and textbooks despite numerous technological innovations. According to the Metaverse blog site, "Metaverse is a democratized platform that allows anyone to create interactive content in augmented reality" (Mystakidis, 2022).

Metaverse offers a number of features that make it interesting from an educational point of view. It includes a studio tool for creating AR "experiences" that can support student learning and integrate multiple online resources (MacCallum & Parsons, 2019).

Metaverse was first used in Neil Stevenson's science fiction novel Snow Crash in 1992, referring to a world where virtuality and reality interact and create value through various social activities. As the scope of the Metaverse is vast and constantly growing, there are various definitions and similar concepts. The real space where people live is reproduced digitally and additional

simulation information is added. The Metaverse refers to a three-dimensional virtual world where avatars engage in political, economic, social and cultural activities (Young -Gab Kim, 2022).

"Avatar" is a Sanskrit word for the manifestation of a deity in human form (Mystakidis, 2022). Avatar means an alter ego that descends to earth and is based on the concept that a fundamental being transforms its form into a human being. Previously, the avatar was used as a predefined exaggerated form in the virtual world rather than reflecting the real world. But gradually it becomes an idealized form that reflects appearance and reflects the ego. An avatar plays a social role in the Metaverse that fits a job and a person. The components of the Metaverse in general are persistence, concurrency, economy and interoperability (Young-Gab Kim, 2022).

While the Metaverse offers many of the possibilities of virtual environments, it also has many limitations. The high cost of equipment is a barrier to mass adoption that is expected to be mitigated in the long run. Other limitations can be classified into four categories related to physical well-being, health and safety, psychology, morality and ethics data privacy. At the physical level, user distraction in location-based AR applications has led to harmful accidents. Information overload is a psychological challenge that needs to be avoided (Park & Kim, 2022).

Moral issues include unauthorized amplification and fact manipulation to biased opinions. Data collection and sharing with other parties poses the risk with the widest implications for privacy. The additional layer of data can emerge as a potential cybersecurity threat. Volumetric capture and spatial doxing can lead to privacy breaches. More importantly, Metaverse actors may be tempted to compile biometric psychographics of users based on the emotions of user data. Immersive technologies will have further applications in the areas of Spatial Computing and Brain-computer interface. Spatial Computing therefore should be open to all hardware-independent, networked and collectively controlled. In relation to VR, motion sickness, nausea and dizziness are among the most frequently reported health problems (Mystakidis, 2022).

This study aims to reveal teachers' views on the use of Metaverse environments in education. To be more specific, we explore their perspective on the concept of Metaverse and their understanding, awareness and any misconceptions if found of the concept itself. Also, if they perceive the Metaverse environment as a potential learning space like accessibility and potential challenges. In addition, self-efficacy of using Metaverse meaning teachers' confidence and perceived ability to utilize the Metaverse effectively in their teaching practice comfortably. And finally the place of Metaverse in education as in the how metaverse may enhance student engagement and motivation in learning. While doing research on metaverse, a limited number of studies were found and these studies consist of studies aimed at understanding what the concept of metaverse is. Our study looks into what teachers' views are about its use in the educational environment and will be a resource for those who will work in this field in the future. By exploring these through a qualitative content analysis of teachers' perspectives, our study aims to gain valuable insights into their readiness, concerns, and expectations regarding the Metaverse in the classroom.

METHOD

The semi-structured interview method, one of the qualitative research methods, was used to follow a predetermined guide but allow for flexibility and exploration based on the participant's responses. The semi-structured interview method is a cornerstone of qualitative research, offering a

flexible and in-depth approach to exploring participants' experiences and perspectives (Creswell & Creswell, 2017). Unlike structured interviews, which follow a rigid set of questions, semi-structured interviews utilize a pre-determined guide of open-ended questions that allow for spontaneity and exploration (Kvale & Brinkmann, 2009). This enables researchers to tailor the interview to each participant's unique responses, delve deeper into emerging themes, and gain a richer understanding of the topic under investigation (Rubin & Rubin, 2012). The semi-structured format allows participants to express their experiences in their own words, providing valuable insights into their thoughts, feelings, and motivations (Seidman, 2013). The guide served as a roadmap, ensuring essential topics were covered while allowing for the exploration of emergent themes and individual variations in experiences (Flick, 2014). This dynamic approach fostered a comfortable and collaborative environment, encouraging participants to share their unique perspectives and narratives (Rubin & Rubin, 2012). Interviews were audio-recorded and transcribed verbatim for rigorous analysis.

DATA COLLECTION

Tool

We have utilized open-ended questions to elicit in-depth responses and explore participants' experiences and perspectives. The data in the study consisted of 9 questions related the aforementioned educational elements ensuring that our questions are clear, concise, and directly related to our research objectives, to determine the opinions of 11 teachers teaching in one of the central schools of Sakarya province in 2022 about the use of Metaverse environments in education. Preliminary findings were shared with some participants to confirm the accuracy of our interpretations.

Research Questions

- When did you first hear about the Metaverse?
- What do you think about using Metaverse as an educational environment?
- Which methods, techniques and materials do you think will be used in Metaverse environments?
- What do you think will be the roles and responsibilities of teachers in Metaverse environments?
- At which stage of education do you think Metaverse would be more useful?
- What impact do you think Metaverse environments will have on student development?
- What kind of education process will be applied in Metaverse environments?
- How do you think student assessment will be done in Metaverse environments?
- Do you feel confident in using Metaverse technology?

While preparing the questions, the basic elements of the education system such as the curriculum, teaching methods and strategies teachers use to deliver the curriculum effectively and student assessment were taken into consideration. We clearly defined the research questions and

objectives to guide the development of your questionnaire accordingly. Then we familiarized ourselves with the current curriculum, pedagogical approaches, and assessment methods used within the education system. We have also pilot tested our questionnaire with a small group of respondents to identify any potential problems, ambiguities, or biases that allowed us to refine our questions and improve the clarity and effectiveness of our questionnaire.

STUDY GROUP

The study group of the research consists of 11 teachers who teach in one of the central secondary schools in the province of SAKARYA in 2022, determined by the convenience sampling method which is a type of non-probability sampling method in which researchers select participants based on their availability and ease of access. The reason for choosing this study group is that the sample is close to the researcher, thus providing speed and practicality to the research. In order not to reveal the names of the teachers in the research group, in line with ethical rules, the teachers were given numbers such as T1, T2, T3, T4, T4, T5, T6, T7, T8, T9, T10, T11.

Table 1: Participant Characteristics

	Age	Sex	Professional Year	Branch
T1	37	Female	3	Music
T2	24	Female	10	Teacher
T3	31	Male	4	Teacher
T4	42	Female	20	Teacher
T5	*	*	*	Teacher
T6	29	Female	6	Teacher
T7	*			Teacher
T8	30	*	7	Teacher
T9	30	Male	9	English
T10	34	Female	12	Teacher
T11	*	*	*	Teacher

When referring to the table or figure in main text, please use such examples as “given in Table 1”, “as explained in Figure 1”, “as may be understood from Table 4”, instead of using repetitions such as “when examining Table1; when examining Table 2 etc.”

DATA COLLECTION PROCESS

The first step in the data collection process was to contact the teachers in the designated school to obtain permission for the audio recording to be used in the interview and to determine a common time for the interview. The interview was conducted with 11 teachers. In the interview, a comfortable conversation atmosphere was first created for the teachers to answer the questions comfortably. The questions were asked to all 11 teachers in the same order and in the same way. After the interview, the questions were written down and sent to the participants via e-mail to confirm the accuracy of the answers. The data obtained were used in this study.

DATA ANALYSIS

In the study, the interview data were analyzed using the content analysis method. It is a systematic iterative technique in which some words of a text are summarized with smaller content categories by coding based on certain rules, and inferences are made to recognize certain features of a message in an objective and systematic way (Harwood & Garry, 2003). As a result of the study, teachers' views on the use of Metaverse environments in education, as well as teachers' knowledge about the concept of Metaverse and their perceptions of self-efficacy in the use of Metaverse were obtained through interviews. After the content analysis was conducted in line with the answers received, and after the completion of data collection four main themes can be formed as follows: recognition of the concept of Metaverse, Metaverse environment, self-efficacy of using Metaverse and the place of Metaverse in education. The questions asked to the participants and the data obtained are shown below.

The main aim of the study was to collect evaluative feedback from teachers and their views about metaverse teaching environments. The answers to the open-ended questions were categorized within each question to identify similar answers. The recurring content of the responses was identified. Finally, frequency counts of frequently occurring responses were tabulated and converted into percentages for reporting purposes.

VALIDITY AND RELIABILITY

Reliability and validity were taken into consideration during this research. The most basic feature of a scientific research is that the results should be credible. For this reason, a scientific research should comply with validity and reliability criteria (Yıldırım & Şimşek, 2013). While collecting the research data, it was tried to obtain more realistic and sincere data by allowing a comfortable time period for the participants to answer the questions. To enhance validity and reliability an audit trail was kept to maintain a comprehensive record of all research decisions, procedures, and data analysis processes to promote transparency and accountability. During the interview, the answers were recorded both in audio and written form. After the results of the data obtained in the interview were interpreted and converted into written text, the answers were confirmed in an attempt to increase validity and reliability.

FINDINGS

As a result of the study, teachers' views on the use of Metaverse environments in education, as well as many questions such as teachers' knowledge about the concept of Metaverse and their perceptions of self-efficacy in the use of Metaverse were answered through interviews. As a result of the content analysis conducted in line with the answers received, four main themes were formed as recognition of the concept of Metaverse, Metaverse environment, self-efficacy of using Metaverse and the place of Metaverse in education. The questions asked to the participants and the data obtained are shown below.

Teachers' answers to the question "When did you first hear the concept of metaverse?" are shown in Table 2.

Table 2: Theme: Defining the concept of Metaverse

Codes	*Participants*	*f*
Less than 1 year	T2,T5,T7,T9	4

1 to 2 years	T1,T3,T6,T8,T10,T11	6
Over 2 years	T4	1

According to Table 2, it was concluded from the answers received from the participants in the research that the rate of teachers' recognition of the concept of metaverse is only 1 person who has known the concept of metaverse for more than 2 years and the duration of knowing the concept of metaverse is gathered between 1-2 years at most and is known by 6 people. Some examples of the answers received from the teachers are as follows.

“It has been 1 year” (T1)

” I heard about it 5-6 months ago” (T2)

” I heard about it in 2020” (T3)

” I heard about 2 years ago” (T4)

” I learned about it in a training last year” (T11)

” 2 months ago” (T9)

Teachers' answers to research questions 2, 3, 4, 5, 6, 7 and 8 and the themes and categories created as a result of their answers are given in Table 3.

Table 3. *Theme: Findings on the Metaverse environment*

Codes	*Participants*	*f*
Useful/successful and facilitative	T1,T2,T3,T5,T10,T11,	6
Inefficient / unsuccessful and incompetent	T4,T7,T8,T9	4
No idea	T6	1
Brainstorming	T11	1
Online Classes	T5,T10	2
Virtual Reality	T2, T3,T6,T7	4
Active by doing / experiencing	T1,T9	2
Teacher-dependent	T4	1
No opinion	T8	1
Ensures credibility	T1,T8	2
Managing, informative	T2,T5,T9,T10	4
Advisor, guide	T3,T6,T8,T11	4
Teachers addicted to technology	T7	1
No change will take place	T4	1
Positive impact	T1,T2,T3,T4,T5T6,T11	7
Negative impact	T9	1
Subject to change (Depends on the student)	T4,T10	2

Constructivist education	T7,T11	2
Individual training	T10	1
Virtual education	T1,T5,T6	3
Hybrid education	T8	1
Failed	T4	1
Different	T2,T9	2
Facilitating/Comfortable	T3	1
Adaptability/Performance	T2,T11	2
Standardized Exams/surveys	T1,T3	2
Online activities	T5,T6,T7	3
Cannot be trusted	T8,T9	2

In regards to Table 3 above, the answers to the question "What do you think about the use of Metaverse as an educational environment?" asked to the teachers in the category of "Educational environment" in the theme of "Metaverse Environments" were as follows: 6 people said that the metaverse environment would be useful and successful, 4 people said that it would create an inefficient and unsuccessful educational environment, and 1 person said that they had no idea, expressing the view that the educational environment was uncertain. Some examples of the answers received from the teachers are as follows.

> ” The importance of technology has increased even more with distance education. I think the virtual world will facilitate education” (T1)

> ” Its use will be beneficial in terms of intervention in education” (T3)

> ” In our country, I think that the action targeted in theory and the success to be expected in the continuation will not be as expected” (T4)

> ” It does not make sense if it will not be used in the school environment. Supervision and motivation will be insufficient” (T8)

> ” Considering the distance education process, I think that students see the digital environment only as a means of entertainment” (T9)

As shown in Table 3 above" In the "Metaverse environments" theme, in the category of "Methods, techniques and materials to be used", the answers to the question "Which methods, techniques and materials do you think will be used in Metaverse environments?" were given by 4 teachers who said that the most preferred answer by the participants was that it would be created using virtual reality materials and glasses, while the number of teachers who said brainstorming, it may vary depending on the teacher and no idea was 1. The other answers were given by 2 teachers who said that it would be done by using online classes and by doing and experiencing. Some examples of the answers received from the teachers are as follows.

> ” With virtual reality, events, methods, techniques will be more remarkable and permanent” (T2)

> ” Virtual spaces, computers and virtual reality glasses... ”(T3)

” Online classes can be created. 3D technology can be utilized” (T5)

” I don't have any knowledge, but it will be a collaborative method with plenty of activities, far from the classical teaching logic based on Web 20 tools” (T8)

” We will not use our old methods much. Online education, virtual classroom, virtual games etc.” (T10)

As seen in Table 3 above" In the theme of "Metaverse Environments", in the category of "Teacher's role and responsibility", the answers to the question "What do you think the roles and responsibilities of teachers will be in Metaverse environments?" were that 5 people think that teachers will take on the role of administrators and informers in this process, 4 people think that teachers will be in the position of advisors, 2 people think that teachers will take on the task of ensuring technology reliability in this process, 1 person thinks that teachers will be technology-dependent in this process and 1 person thinks that there will be no change in the roles and responsibilities of teachers. Some examples of the responses received from teachers are as follows.

” Guiding, creating an environment” (T3)

” I don't think it will increase, it will remain the same” (T4)

” Teachers who are more dependent on the internet and technology will emerge” (T7)

” They will be in a directive position. They will organize in-class activities and make sure that children use safe platforms... ” (T8)

” In this already planned education system, the teacher will be in the position of a manager and will transfer his/her knowledge” (T10)

"In the theme of "Metaverse environments" in table 3, in the category of "student development", the answers to the question "What effect do you think Metaverse environments will have on student development?" were that 7 teachers said that these environments will have a positive effect on student development, 1 said that these environments will have a negative effect on student development, and 2 said that student development depends on the individual differences of the student and may vary according to the individual. Some examples of the answers received from the teachers are as follows.

” It will vary according to the knowledge and evaluation of students and parents about the subject” (T4)

” I don't think it will have a positive effect. It may cause them to acquire behaviors such as taking the easy way out and reaching the result without making any effort” (T9)

” A student who establishes a balance between real world and metaverse will benefit from this system” (T10)

Next in the theme of "Metaverse Environments", in the category of "Educational process", the answers to the question "What kind of educational process do you think will be applied in Metaverse environments?" were that 3 teachers said that they would use virtual education processes, 2 teachers said that they would be processes created with a constructivist education approach, 2 teachers said that a different process was waiting for students, and 1 teacher said that a successful

education process could not be created in these education processes. The other answers were given by 1 teacher who thought that an individual, mixed and easy/comfortable education process would be formed. Some examples of the answers received from the teachers are as follows.

” A constructivist education process will be applied in Metaverse environments” (T11)

” One-to-one education. This education seems to end teacher-student interaction” (T10)

” A different perspective will come to education” (T2)

” Self-managed education where they can instantly return to the subject and topic they want” (T3)

” A hybrid system will be applied. I think it will be applied part-time at school and part-time at home (T8)

” It needs to be updated according to the changing world conditions and requirements. I believe that classical methods will not bring the success that face-to-face education will bring in a virtual environment” (T4)

As seen in Table 3 above" In the theme of "Metaverse environments", in the category of "student assessment", the answers to the question "How do you think student assessment will be done in Metaverse environments?" were as follows: 3 people answered that online activities will be used, 2 people answered that standardized exams will be used, 2 people answered that it will be based on students' adaptation skills/performance skills to the metaverse environment, and 2 people answered that student assessment in the metaverse environment will not be reliable. Some examples of the answers received from the teachers are as follows.

” Students should be evaluated according to whether they adapt to the environment or not” (T2)

” It should be evaluated by exams and different presentation methods” (T4)

” It can be done with online activities and homework” (T5)

” Even if the necessary environment is created to provide metaverse, it will be difficult for the assessments to be reliable” (T8)

” I do not think that a reliable measurement can be provided in a digital environment. Even our electronic exams are proctored” (T9)

” Student's performance can be evaluated in metaverse environments” (T11)

Teachers' answers to the question "At which stage of education do you think Metaverse should be used?" are shown in Table 4.

Table 4. *Theme: The Use of Metaverse in the Education Process*

Codes	*Participants*	*f*
During the Research Phase	T1	1
In Classroom Activities / Process	T2, T4, T6, T3	4

Long Distance Trips	T4	1
Laboratory Activities	T4	1
In Social Activities	T5, T9	2
During the Evaluation Phase	T11	1
In Every Stage	T3, T10	2
At University	T7, T8,	2

According to Table 4, we see that 3 of the participants in the study gave the answer that Metaverse should be used in classroom activities at the process stage, 2 people in social activities, 2 people at the university and 2 people at every stage of education. Other people answered that it would be useful to use it in long distance trips, 1 person in laboratory activities and 1 person in the evaluation phase. Some examples of the answers received from the teachers are as follows.

” When doing research, a student who likes to play games can do the research while playing and learn with games” (T1)

” It can be used at every stage” (T3)

” It can be used in classroom activities, long distance trips, laboratory studies” (T4).

” It should be used at the university” (T7)

” It should be kept especially away from young children. It should be used more after university and high school field selection” (T8)

” It can be useful for students to develop in the social field and to gain the perspective of cultural and artistic activities” (T9)

” It can be used at every stage, but we will probably learn how and where to use it through trial and error” (T10).

” I think it will be more useful if Metaverse is used in the evaluation stage of education” (T11).

The answers to the question "Do you have confidence in using Metaverse technology?" are given in Table 5:

Table 5. *Theme: Self-efficacy in using metaverse*

Participant	*Experience*	*%*
I trust	T2, T8, T9	3
I do not trust	T4, T6, T7	3
I need to get training	T3,T5,T11	3
Not sure	T1, T10	2

As in Table 5, the answers received from the participants regarding the self-efficacy of using Metaverse technology from the participants who participated in the research are as follows: 3 people said I am confident / I trust myself, 3 people said I am not confident / I do not trust myself, 3 people said I believe I can succeed if I receive training, and 1 person said they are not sure and indecisive. Some examples of the answers received from the teachers are as follows.

"I am not sure, maybe yes maybe not "(T1)

"I trust myself. I am always open to innovations, but I do not trust the students "(T2)

"I don't think I will have any problems if the necessary trainings are given "(T3)

"No "(T4)

"I think I don't have enough knowledge at the moment. I can improve myself more in time "(T5)

"Yes, I am confident "(T8)

"I am confident but I don't think it is necessary "(T9)

"I am not very competent in using Metaverse technology "(T11)

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

The Metaverse is a post-reality universe, a persistent and permanent multi-user environment that combines physical reality with digital virtuality. It enables seamless embodied user communication in real-time and dynamic interactions with digital artifacts.

In this study, teachers' opinions on the use of the concept of metaverse in education and the results it will bring and its applicability were recorded. According to the results of the responses, Teachers are still reluctant to embrace it. The fact that the technology is new and still developing is a major factor in this resistance. Teachers frequently lack the resources and training needed to successfully traverse this foreign environment and incorporate it into their curricula. Their concern is exacerbated by worries about possible hazards including invasions of privacy and social isolation. In addition, many educators are cautious due to the lack of clarity regarding the Metaverse's long-term sustainability and ethical consequences. Despite these reservations, many educators are optimistic about the Metaverse's potential to change the classroom environment. The Metaverse's immersive and interactive nature promises to engage students in ways that traditional learning methods cannot, enabling deeper comprehension and richer experiences. Virtual field visits to historical locations, collaborative learning settings where students may connect across geographical borders, and individualized learning pathways that cater to individual needs and learning styles are all possibilities for educators. The possibilities appear limitless, revealing a future in which education is more entertaining, accessible, and successful than ever before. Students can develop a range of different skills when creating their own AR experiences in Metaverse. It includes a studio tool for creating AR "experiences" that can support student learning and integrate multiple online resources (MacCallum & Parsons, 2019).

While the Metaverse provides fascinating educational opportunities, some teachers are concerned about its possible impact on the classroom. There is widespread concern that technology will exacerbate existing disparities and create a reliance on technology. They are concerned that the

immersive aspect of the Metaverse may worsen the digital gap, further lagging behind impoverished students. Furthermore, the possibility of addiction and social isolation in virtual worlds raises worries about students' well-being. Furthermore, some teachers believe that the Metaverse may dehumanize the learning process by substituting technology-mediated interactions for real-life relationships. They are concerned that the emphasis on technology may overshadow the development of critical social and emotional skills.

Due to the wide scope of the Metaverse, we do not have a clear understanding of how it works, why it is needed, or even what it can do because of its new components. Metaverse is a compound word of transcendence meta and universe and refers to a three-dimensional virtual world where avatars engage in political, economic, social and cultural activities. The metaverse is not the real world, but it can provide a tangible feel, so it can provide services based on immersive user-interactive stories.

Online learning is becoming increasingly common, especially in higher and adult continuing education. The COVID-19 pandemic has accelerated this trend, disrupting attendance-based activities at all levels of education. While the Metaverse is still in its formative stages, its potential to transform education is evident. As they wrestle with the potential and problems it brings, teachers express a range of emotions, from skepticism to excitement. While concerns about technological dependence, social isolation, and ethical consequences are genuine, many educators believe that the promise of interactive, immersive, and individualized learning experiences trumps these issues.

To sum up, the Metaverse's effectiveness in the classroom will be determined by careful design, responsible implementation, and an emphasis on improving, rather than replacing, traditional learning techniques. Teachers may usher in a new era of interesting and successful teaching by exploiting the Metaverse's strengths while resolving its limits, preparing pupils for a technologically influenced future.

The following suggestions can be made based on the findings of the study:

1. Since the Metaverse environment is new, it hides many unknowns. For this reason, precautions should be taken into consideration such as educating students about digital citizenship and the risks of cyberbullying.

2. Metaverse environment may have beneficial and harmful aspects, so it should be analyzed well and should be used in educational environments accordingly.

3. Before implementing metaverse in the classroom, the roles and responsibilities of teachers in metaverse environments begins therefore in-service training should be provided to teachers on this issue, thus improving the self-efficacy of using metaverse.

4. Students' freedoms in metaverse environments should be limited to a certain extent, and in this way, reliability restrictions should be made.

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AUTHOR CONTRIBUTION

The First author has made substantial contributions to conception and design, analysis and interpretation of data.

The second author has been involved in the collection of data and revising it critically for important intellectual content.