Indonesian Society for Science Educators
Journal of Science Learning
journal homepage: ejournal.upi.edu/index.php/jslearning

A Research on Teachers' Views about the Metaverse Platform and Its Usage in Education

Gülşah Gürkan[1]*, Harun Bayer[2]

[1]Science education, Akcadag Vocational School, Malatya Turgut Ozal University, Malatya, Turkey
[2]Education Technologies, Akcadag Vocational School, Malatya Turgut Ozal University, Malatya, Turkey

*Corresponding author: gulsah.gurkan@ozal.edu.tr

ABSTRACT This study was conducted to determine primary and secondary teachers' views of the concept of "metaverse". In line with the aim of the study, a questionnaire consisting of closed and open-ended questions about the metaverse platform and its applications in the field of education was applied to 122 teachers. The results showed that approximately 65% of the teachers stated that they knew the concept of the metaverse and its applications. In addition, approximately 55% of the teachers stated that they first heard about the metaverse concept from social media, and 45% stated that they were most aware of metaverse applications in the field of play. Most teachers (69.7%) answered no about the benefits of the metaverse platform in education. Approximately 95% of the teachers stated that they wanted seminars and workshops on metaverse applications in education and wanted these studies to be mostly aimed at introducing the metaverse platform and its applications in the educational environment. Based on the study results, introductory pre-service and in-service studies can be conducted for teachers regarding the metaverse and its applications in the field of education and its possible benefits.

Keywords Education, Metaverse Platform, Teachers, Views

1. INTRODUCTION

Changes in computer science are meeting with us at every point of our lives daily. It can be said that technology provides solutions to the problems in the area we live in, makes our lives easier, and contributes to its rapid progress. We can now perform many of our works with new-generation technologies. We can participate in a virtual lesson at one end of the world with our avatars and exchange information. With an intelligent bracelet or necklace on our wrists, we can organize our work and calculate the daily calories we burn. We can calculate body temperature with a dress we wear and earn money in the virtual environment with a unique piece of art we have designed. As seen from the examples, technology has entered almost every aspect of our lives. Metaverse is one of these essential and popular technologies that are rapidly accepted in our lives thanks to the innovations it brings.

The term metaverse was first mentioned by an American science fiction writer, Neal Stephenson, in his novel Snow Crash (1992). The term metaverse, described as an online parallel universe beyond dreams, is also defined as a 'digital universe' where the real and digital worlds merge (Software Policy & Research Institute [SPRI], 2021). Furthermore, the metaverse is a network created by real-time 3D (Three-Dimensional) objects, providing a sense of presence, and immersive experiences can be made simultaneously with unlimited users (Ball, 2021). Another definition, metaverse, is called "a permanent virtual space based on computer interaction, where several users live, represented by iconic images called avatars, which can communicate with each other in a synchronized manner" (Reis, Escudeiro & Escudeiro, 2010).

Virtual environments such as virtual reality and augmented reality allow the creation of immersive environments, which consist of interactive, multi-user environments created in a way that appeals to many senses with digital models, virtual designs, and people (Mystakidis, 2022). Zuckerberg (2021) defined the term metaverse as a post-internet where experience where we can not only look at but also touch the objects in the environment. Metaverse is a platform where family meetings and business trips can be made, and interaction with friends can be made in the

Received: 31 August 2022
Revised: 02 December 2022
Published: 20 March 2023

same domain. In addition, in metaverse platforms, shopping can be done by touching the products in the environment. One can quickly switch from one of these environments to the other without wasting time by being in different backgrounds. And with the metaverse, more people will be found as producers in this universe than some early achievements of humanity (reducing carbon emissions, preventing time losses, etc.) (Zuckerberg, 2021).

Allen (2021), on the other hand, while defining the term metaverse, pointed out that it will not only be at the fingertips like the internet but will be an important part of life, work life, and leisure time. Furthermore, while only virtual worlds were mentioned as the metaverse before, it is now expressed as the technology that connects the virtual and real worlds (Park & Kim, 2022).

It is inevitable to make basic moves in countries' policies against new technologies that can profoundly affect almost every aspect of our lives. For example, sales of commodities created by professionals and users are viral today. With a virtual identity or avatar, people can enter the roles they want in the digital universe, buy the products they want and perform many actions they think. We can say that this situation has caused technology to progress much faster than other technologies.

With the functionalization of what is experienced in the real world in the metaverse, which is the universe beyond the internet, we have encountered the formation, design, and design of objects, living things, beings, and events similar to those in the real world. From this point of view, many business issues have come to the fore in the metaverse, the universe beyond the internet. As a matter of fact, during events similar to those in the real world, in the case of personal actions, objects in the real world will be moved to the metaverse environment, perhaps by reference.

Many industry organizations (Facebook, Pokemon, Microsoft, Coca-Cola, Dolce & Gabbana) have made valuable attempts to take place in the digital universe after observing the rapidly rising value of the metaverse. According to the report of Gartner (2022); stated that 25% of people will use at least one hour a day for education, socializing, shopping, and having fun until 2026. The largest metaverse investors collaborate with many companies to offer various products and services in the metaverse universe. As a result of collaborations, Meta has created a metaverse platform called "Horizon Home" with its initiative (Bostancı & Uncu, 2021). However, startups such as Roblox, Sandbox, and Minecraft have attracted the attention of technology companies and have become important agenda items that many companies invest in in the metaverse environment.

In the metaverse environment, the favorite of new investments, massive data is calculated instantly, and data flows have to be continuously provided between real and virtual. In Figure 1, the metaverse was explored by Ball (2021) in eight main-dimensional frameworks.

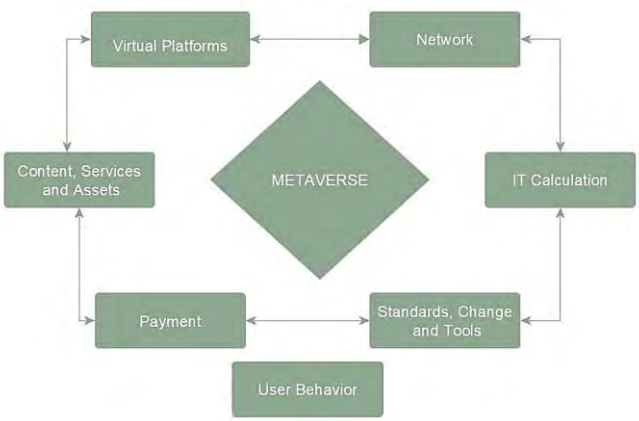

Figure 1 Metaverse framework (Ball, 2021)

It has been stated that each of these dimensions has a critical importance in forming the metaverse. For the metaverse universe to be formed, dimensions such as hardware, network, computing, virtual platforms, exchange tools and standards, payment methods, metaverse content, services, assets, and user behaviors must come together (Ball, 2021). Suppose we expand the dimensions, just as certain hardware is required to enter the internet. In that case, hardware such as VR (Virtual Reality) devices, headsets, and gloves are currently needed to enter the metaverse universe. In addition, high bandwidth and high-speed internet infrastructure are required for the metaverse.

One of the crucial developments regarding the mentioned eight dimensions is the new professions that will be evaluated within the scope of providing content and service. Educational institutions need to update their curricula to meet these new professions' needs. It is an important issue that education curricula, which is an inevitable situation to meet the needs of the sector in education, prepare students for the future. Therefore, new technologies such as metaverse in education in the 21st century can be necessary for providing better learning environments and gaining the needed skills. Virtual and augmented reality technologies directly related to the metaverse have an important area of use in education (Damar, 2021). In this respect, we can say that virtual and augmented reality technologies are related to the metaverse universe. To provide better learning environments in education, it is necessary to take advantage of the constantly developing technology (Şenel & Gençoğlu, 2003).

With the Covid-19 pandemic process, all people emotionally distanced themselves from each other socially and physically distance, especially students, who had to stay away from the school environment and continue their education only on the screen. Covid-19, which has affected the whole world, has accelerated the digital transformation process based on technologies such as artificial intelligence,

cloud, and metaverse by revealing new life situations, especially in fields such as economy, education, and culture. During the Covid-19 pandemic, there has been a significant orientation to online educational environments.

With the spread of non-face-to-face communication culture and digital technologies, teachers and students in the field of education conducted their lessons in various ways based on online classes. They blended learning models in non-face-to-face situations (Jeon & Jung, 2021). In online learning environments, students' repetitive learning opportunities, regardless of time and place, are seen as an advantage in individual learning (SPRI, 2021). However, in two-dimensional online environments, as seen in Table 1, students are passive listeners and not actually in the environment. They only hear what is being said.

For this reason, there is a feeling of being outside in two-dimensional virtual environments. However, teachers' lack of experience, connectivity problems, weak interactions between student-student and student-teacher (Park & Kim, 2022), and students' inability to fully involve themselves in the process have significantly decreased education quality. Insufficient interaction in online environments cannot encourage motivation and desire for lessons, and there are also concerns that these limitations may cause in the future (Kang, Cho, Kim & Choi, 2020). Masters et al. (2020) stated that the tendency towards distance education had increased significantly during the pandemic process, and with this increase, reality-enhancing solutions are sought for more effective teaching. With the developments in computer science, it has been understood that metaverse and its types can be used to solve problems such as interaction in the online environment. Teaching and learning activities planned using virtual and augmented reality technologies, which are metaverse types, encourage students to active learning and constructivism. It is because virtual or augmented reality stimulates the student's five senses, providing opportunities to participate in activities that are difficult to experience due to space and cost constraints or risks (Han & Noh, 2021). For example, in the field of education, Berkeley University turned its graduation ceremony into a virtual environment and held it on the Minecraft platform (Berkeley.edu.tr, 2020).

Permanent learning can be supported by creating rich learning environments with visual and auditory tools that appeal to more than one sense organ. As a result, active learning instead of passive learning can be experienced, especially in the metaverse world. Thanks to the experiences in this virtual universe, active learning can be realized, and students' motivation is positively affected (Park & Kim, 2022). Furthermore, multiple learning tools and online resources can be integrated into the metaverse environment (Carmona-Vickery, 2018), providing an opportunity to connect to the remote experience with a location-based trigger (MacCallum & Parsons, 2019). Due to such contributions, it can be said that metaverse technology will support effective and permanent learning in learning-teaching environments.

Metaverse technology offers learners in the same environment a high level of freedom in production and sharing (Kye, Han, Kim, Park & Jo, 2021). This situation may provide students with a positive attitude towards the lesson or technology and may affect the metaverse views of students and teachers. The differences between online meeting platforms and metaverse platforms are given in Table 1.

Using the metaverse in the educational environment allows students to enter the virtual school environment with their friends in distance learning processes. Each student, classmate, and teacher has an avatar in three-dimensional virtual environments such as the metaverse. By providing the closest setting to physical reality in the metaverse environment, students will be able to have a sense of presence in the learning environment. In this context, students will experience the feeling of "social presence" with their friends and teachers in a three-dimensional classroom environment. In the metaverse environment, the student experiences the feeling of togetherness, as he is aware of his presence in the classroom and that his other friends are mindful of him. The sense of presence also provides high motivation. Thanks to the three-dimensional virtual environment,

Table 1 Differences between the online meeting platform and the metaverse platform (Jeon & Jung, 2021)

Factor	Online meeting platform	Metaverse platform
Education leadership	Teacher > Student	Teacher = Student
The role of the instructor	Event leadership	Limited intervention at events
	Providing educational materials	Providing materials tailored to learners' needs
Instruction formats	Teacher-centered learning	Student-centered learning
	Knowledge transfer and sharing	Seeking and accessing information
Scope of use	Using the instruction screen	Use of various interaction states
Participation	Available only when the teacher opens an online meeting	Continuous access Flipped learning opportunity

when you want to make a presentation, you can make the presentation just like in the natural environment, interact with other friends and have social interactions after the lesson. Through the virtual schools provided by metaverse, students can overcome their deficiencies after face-to-face education, and orientation can be delivered to adapt to school and overcome school phobia (Tokel, 2021).

It can be said that the use of metaverse, especially in science education, will benefit learning, as it can provide opportunities to participate in learning activities that are difficult to experience due to time, space, and cost constraints or risks. Science success and permanent learning can be achieved by conducting experimental activities and laboratory studies in three-dimensional virtual environments since it is known that science lessons conducted based on experiments increase students' interest, participation, and attitude in the lesson and provide permanent learning (Yeşilyurt, Kurt & Temur, 2004; Yeşilyurt, Kurt & Temur, 2005). Virtual world environments; allows artists to design fantastic objects, architects to participate in collaborative work by building online structures, researchers to conduct experimental work, and instructional designers to create realistic environments, tools, and social experiences (Hai-Jew, 2010).

Technology integration with teaching supports student learning and enables them to keep up with the digitalized society (Mayer, 2019; US Department of Education, 2020). However, the effectiveness of using technologies in teaching varies depending on how they are used during instruction (Chauhan, 2017; Stegmann, 2020). Studies have shown that teachers only make limited use of the different potential of technology in their lessons and use technologies to replace previous teaching processes such as presentations or textbooks (Fraillon, Ainley, Schulz, Friedman & Duckworth, 2019). With the metaverse platform, technology is expected to enable interactive teaching activities rather than books or only visual content transfer in education. Therefore, it can be said that supporting technology, which is an integral part of our lives in education and training, with new studies that will increase student success, permanent learning, motivation, and interest in the course will be beneficial for the effectiveness of the technology. In this context, the study was conducted to determine teachers' views of the metaverse platform, a new technology. This study was carried out with teachers to raise awareness about using the metaverse, one of the latest technologies, in the field of education and to draw attention to the subject. In this respect, it is thought that the present study will contribute to the literature.

2. METHOD

2.1 Research Model

This study was conducted to reveal teachers' views of the metaverse platform. The study was designed according to the survey model, which enables inferences from the selected sample. In this model, survey arrangements are made over the whole universe or a group, sample, or sample to be taken from it to make a general judgment about a universe consisting of many elements (Karasar, 2010).

2.2 Participants

The study group consists of teachers from different levels and branches working in schools affiliated with the Ministry of National Education in Malatya province of Turkey. The study was conducted with 122 primary and secondary school teachers. Demographic information of the teachers participating in the survey is given in Table 2. The study group was determined by the easily accessible sampling method, one of the purposeful sampling methods. Because this sampling method is fast and convenient (Patton, 2018). In this sampling method, researchers choose a situation that is close and easy to access (Yıldırım & Şimşek, 2018).

Table 2 Demographic variables regarding participants

Variables		N	%
Gender	Female	72	41.3
	Male	50	58.7
Age	25-29	4	3.3
	30-34	17	14
	35-39	43	34.7
	40-44	29	24
	45-49	15	12.4
	50-54	6	5
	55-59	8	6.6
Seniority	1-5	10	8.3
	6-10	16	13.2
	11-15	30	24
	16-20	32	27.3
	21-25	20	15.7
	26 and over	14	11.6
Field of Study	Classroom Teacher	42	33.9
	Information TechnologiesTeacher	29	24
	Science Teacher	5	4.1
	Pre-School Teacher	5	4.1
	Physical Education Teacher	5	4.1
	English Teacher	5	4.1
	Biology Teacher	5	4.1
	Social SciencesTeacher	3	2.5
	Turkish Teacher	3	2.5
	Music Teacher	3	2.5
	Visual Arts Teacher	3	2.5
	School Counselor	2	1.7
	Religious Culture and Moral Knowledge Teacher	2	1.7
	MathTeacher	2	1.7

Table 2 Demographic variables regarding participants (*Continued*)

Variables		N	%
Field of Study	Geography Teacher	2	1.7
	Special Education Teaching	2	1.7
	Literature Teacher	1	0.8
	Physics Teacher	1	0.8
	Technology and Design Teacher	1	0.8
	Accounting and Finance Teacher	1	0.8
	Total	122	100

2.3 Data Collection Tool

To determine the teachers' views about the metaverse, the researchers created a three-part questionnaire form. In the first part of the questionnaire, there is demographic information about the gender, age range, seniority, and branch of the participants. In the second part, closed-ended questions about the metaverse platform, and in the third part, open-ended questions. The reason for using a questionnaire as a measurement tool is that it enables the data collection from a large sample group in a short time and consists of many questions (Balcı, 2012; Büyüköztürk, 2005).

The questions in the second part of the questionnaire: Do you know about metaverse applications? How would you describe your level of knowledge about the metaverse? Where did you first hear about the concept of the metaverse? Which application sector areas of the metaverse did you hear the most? Would you like to hold seminars and workshops about metaverse applications in education? The questions in the third part of the questionnaire: Which subjects do you think the metaverse platform can be more effective in the course environment? If there are any topics you would like to be discussed in workshops related to the metaverse and metaverse platform, could you specify them? While forming the survey questions, studies in the literature were used (Han & Noh, 2021; Jeon & Jung, 2021).

While forming the survey questions, a literature review was conducted, and interviews were held with two academicians who are experts in education, information technologies, and language. In order to ensure the content validity of the draft questionnaire form, the draft form was turned into a pre-application form by consulting expert views. Finally, by making a preliminary application with a group of four teachers, information about the intelligibility and responsiveness of the form was obtained, and it was decided that the questionnaire was suitable for the research.

2.4 Data Analysis

The data obtained in the research were analyzed by using descriptive statistics. First, the frequency and percentage values of the second part of the questionnaire, which included closed-ended questions, were given, and the data were tabulated according to the variables of gender, age, and seniority. In the third part, which includes open-ended questions, the answers given by the teachers are shown in the form of categories. In the analysis of open-ended questions, the inductive content analysis technique was used in the form of coding, finding themes, and organizing data according to codes and articles (Koşar, Er, Kılınç & Koşar, 2017).

2.5 Validity and Credibility

The answers given by the teachers to the questions were analyzed by coding the data, creating the categories, organizing the data according to the codes and types, ensuring validity and reliability, and interpreting the data. First, a list of the answers the teachers gave was created, and categories were made according to the common characteristics of the answers given. Then, by organizing the answers provided by the teachers according to codes and categories, the categories created by two different researchers for the reliability analysis were calculated by determining the numbers of "consensus" and "disagreement" (Reliability = consensus/consensus + disagreement X 100) (Miles & Huberman, 1994). According to Creswell (2013), the agreement between researchers should be at least 80% to ensure reliability. In this study, the desired level of reliability was achieved by reaching a consensus of 90%. In the last stage, the data were interpreted by tabulating.

3. RESULT AND DISCUSSION

The results of the teachers' views on the metaverse are given in this section (Table 3).

Table 3 Distribution of teachers' answers to the question "Do you have knowledge about metaverse and its applications?"

		Yes	No	Total
		Freq. (%)	Freq. (%)	Freq. (%)
Gender	Female	45 (62.5)	27 (37.5)	72 (100.0)
	Male	34 (68.0)	16 (32.0)	50 (100.0)
	Total	79 (64.8)	43 (35.2)	122 (100)
Age	25-29	3 (75.0)	1 (25.0)	4 (100.0)
	30-34	10 (58.8)	7 (41.2)	17 (100.0)
	35-39	28 (65.1)	15 (34.9)	43 (100.0)
	40-44	21 (72.4)	8 (27.6)	29 (100.0)
	45-49	11 (73.3)	4 (26.7)	15 (100.0)
	50-54	3 (50.0)	3 (50.0)	6 (100.0)
	55-59	3 (37.5)	5 (62.5)	8 (100.0)
	Total	79 (64.8)	43 (35.2)	122 (100)
Seniority	1-5	7 (70)	3 (30)	10 (100)
	6-10	11 (68.8)	5 (31.3)	16 (100)
	11-15	18 (60.0)	12 (40.0)	30 (100)
	16-20	23 (71.9)	9 (28.1)	32 (100)
	21-25	14 (70.0)	6 (30.0)	20 (100)
	26 and over	6 (42.9)	8 (57.1)	14 (100)
	Total	79 (64.8)	43 (35.2)	122 (100)

When the teachers were asked whether they knew the metaverse and its applications, 64.8% (n=79) answered yes,

Table 4 Distribution of teachers' answers to the question of "How do you define your level of knowledge about the metaverse?"

		Naive level	Beginning Level	Intermediate level	Advanced level	Total
Gender		Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)
	Female	32 (44.4)	32 (44.4)	6 (8.3)	2 (2.8)	72 (100.0)
	Male	17 (34.0)	20 (40.0)	7 (14.0)	6 (12)	50 (100)
	Total	49 (40.2)	52 (42.6)	13 (10.7)	8 (6.6)	122 (100)
Age	25-29	4 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (100.0)
	30-34	6 (35.3)	8 (47.1)	3 (17.6)	0 (0.0)	17 (100.0)
	35-39	18 (41.9)	16 (37.2)	5 (11.6)	4 (9.3)	43 (100.0)
	40-44	8 (27.6)	15 (51.7)	3 (10.3)	3 (10.3)	29 (100.0)
	45-49	7 (46.7)	7 (46.7)	0 (0.0)	1 (6.7)	15 (100.0)
	50-54	2 (33.3)	2 (33.3)	2(33.3)	0 (0.0)	6 (100.0)
	55-59	4 (50.0)	4 (50.0)	0 (0.0)	0 (0.0)	8 (100.0)
	Total	49 (40.2)	52 (42.6)	13 (10.7)	8 (6.6)	122 (100.0)
Seniority	1-5	5 (50.0)	3 (30.0)	1 (10.0)	1 (10.0)	10 (100.0)
	6-10	6 (37.5)	6 (37.5)	2 (12.5)	2 (12.5)	16 (100.0)
	11-15	14 (46.7)	10 (33.3)	4 (13.3)	2 (6.7)	30 (100.0)
	16-20	8 (25.0)	19 (59.4)	4 (12.5)	1 (3.1)	32 (100.0)
	21-25	9 (45.0)	8 (40.0)	1 (5.0)	2 (10.0)	20 (100.0)
	26 and over	7 (50.0)	6 (42.9)	1 (7.1)	0 (0.0)	14 (100.0)
	Total	49 (40.2)	52 (42.6)	13 (10.7)	8 (6.6)	122 (100.0)

and 35.2% (n=43) answered no. When the answers given were analyzed according to the gender variable, it was seen that the percentage of female teachers (62.5%) who knew metaverse and its applications were less than that of male teachers (68%). It has been observed that the teachers who know the metaverse and its applications are mostly in the 25-29 (75%), 45-49 (73.3%), and 40-44 age ranges (72.4), respectively. In terms of seniority, teachers with a seniority of 16-20 years, who say that they know the metaverse and its applications, are in first place with a rate of 71.9%. Teachers (42.9%) with 26 or more years of experience stated that they had less knowledge about the metaverse and its applications. The distribution of answers given to the question of, "how do you define your level of knowledge about the metaverse" is given in Table 4.

40.2% of teachers are at the naive level; 42.6% are at the beginner level; 10.7% of intermediate level and 6.6% of advanced level them stated that they knew metaverse. When examined according to the gender variable, female teachers indicated their level of knowledge mainly at the level of naivel and beginner. In contrast, male teachers stated their level of expertise as mostly at the beginner level. It was observed that those who expressed their knowledge level as advanced were primarily male teachers at the rate of 12%. According to Table 4, it is seen that teachers generally state that they know the beginning level according to their age ranges. When examined in terms of seniority, it was seen that most teachers (except those with 6-10 and 16-20 years of seniority) expressed their metaverse knowledge level as naive. The distribution of the answers given by the teachers to the question "Where did you first hear about the concept of metaverse" is given in table 5.

In response to the question of where you first heard about the metaverse concept, teachers said social media with a rate of 57.4%. 13.1% of teachers are on television, 9% are at conferences, seminars, etc., educational environments, 18% are from the people around them, and 2.5% stated that they heard the metaverse concept thanks to this research. In terms of gender, it was seen that female teachers listened to the concept of metaverse the most from social media (58.3) and TV broadcasts (15.3%) and people around them (15.3%). In contrast, male teachers heard the concept most from social media (56%) and people around them (22%). Therefore, it has been observed that teachers mostly hear the metaverse concept from social media. In addition, 2.5% of the teachers stated that they heard about the concept of metaverse thanks to the research conducted by us. The distribution of the answers given by the teachers to the question, "Which of the application sector areas of metaverse have you heard the most?" is given in Table 6.

Among the application sector areas of the metaverse, games (~ 45%), economy (~ 22%), education (~ 11%), marketing (~ 10%), culture (9%), and health (~ 2%) were heard by teachers, respectively. While the teachers (Except for the 55-59 age range) stated that they listened to the game the most from the application areas of the metaverse, the teachers in the 55-59 age range indicated that they heard the economy the most. In terms of seniority, it was seen

Table 5 Distribution of teachers' answers to the question of "where did you first hear about the concept of metaverse?"

		Social media (Facebook, Youtube, Instagram, etc.)	From television broadcasts	From educational environments such as conferences, seminars, etc.	From people around me	Thanks to this research	Total
Gender		Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)
	Female	42 (58.3)	11 (15.3)	6 (8.3)	11(15.3)	2 (2.8)	72 (100.0)
	Male	28 (56.0)	5 (10.0)	5 (10.0)	11 (22.0)	1 (2.0)	50 (100.0)
	Total	70 (57.4)	16 (13.1)	11 (9.0)	22 (18.0)	3 (2.5)	122 (100.0)
Age	25-29	2 (50.0)	1 (25.0)	0 (0.0)	1 (25.0)	0 (0.0)	4 (100.0)
	30-34	8 (47.1)	2 (11.8)	1 (5.9)	6 (35.3)	0 (0.0)	17 (100.0)
	35-39	27 (62.8)	4 (9.3)	5 (11.6)	5 (11.6)	2 (4.7)	43 (100.0)
	40-44	17 (58.6)	3 (10.3)	4 (13.8)	4 (13.8)	1 (3.4)	29 (100.0)
	45-49	8 (53.3)	3 (20.0)	1 (6.7)	3 (20.0)	0 (0.0)	15 (100.0)
	50-54	4 (66.7)	2 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)	6 (100.0)
	55-59	4 (50.0)	1 (12.5)	0 (0.0)	3 (37.5)	0 (0.0)	8 (100.0)
	Total	70 (57.4)	16 (13.1)	11 (9.0)	22 (18.0)	3 (2.5)	122 (100.0)
Seniority	1-5	6 (60.0)	2 (20.0)	0 (0.0)	2 (20.0)	0 (0.0)	10 (100.0)
	6-10	7 (43.8)	2 (12.5)	2 (12.5)	5 (31.3)	0 (0.0)	16 (100.0)
	11-15	16 (53.3)	3 (10.0)	4 (13.3)	6 (20.0)	1 (3.3)	30 (100.0)
	16-20	23 (71.9)	3 (9.4)	2 (6.3)	2 (6.3)	2 (6.3)	32 (100.0)
	21-25	9 (45.0)	4 (20.0)	3 (15.0)	4 (20.0)	0 (0.0)	20 (100.0)
	26 and over	9 (64.3)	2 (14.3)	0 (0.0)	3 (21.4)	0 (0.0)	14 (100.0)
	Total	70 (57.4)	16 (13.1)	11 (9.0)	22 (18.0)	3 (2.5)	122 (100.0)

Table 6 Distribution of teachers' answers to the question of "which of the application sector areas of metaverse have you heard the most?"

		Education	Economy	Game	Marketing	Health	Culture	I did not hear	Total
Gender		Freq. (%)	Freq. (%)	Freq.(%)	Freq. (%)	Freq.(%)	Freq.(%)	Freq. (%)	Freq. (%)
	Female	8 (11.1)	18 (25.0)	26 (36.1)	8 (11.1)	1 (1.4)	10 (13.9)	1 (1.4)	72(100.0)
	Male	5 (10)	9 (18.0)	29 (58.0)	4 (8.0)	1 (2.0)	1 (2.0)	1 (2.0)	50 (100.0)
	Total	13 (10.7)	27 (22.1)	55 (45.1)	12 (9.8)	2 (1.6)	11 (9.0)	2 (1.6)	122(100.0)
Age	25-29	0 (0.0)	0 (0.0)	1 (25.0)	1 (25.0)	0 (0.0)	2 (50.0)	0 (0.0)	4 (100.0)
	30-34	4 (23.5)	5 (29.4)	7 (41.2)	0 (0.0)	0 (0.0)	1 (5.9)	0 (0.0)	17 (100.0)
	35-39	5 (11.6)	10 (23.3)	18 (41.9)	7 (16.3)	1 (2.3)	1 (2.3)	1 (2.3)	43 (100.0)
	40-44	2 (6.9)	7 (24.1)	13 (44.8)	3 (10.3)	1 (3.4)	2 (6.9)	1 (3.4)	29 (100.0)
	45-49	1 (6.7)	2 (13.3)	10 (66.7)	0 (0.0)	0 (0.0)	2 (13.3)	0 (0.0)	15 (100.0)
	50-54	0 (0.0)	0 (0.0)	4 (66.7)	1 (16.7)	0 (0.0)	1 (16.7)	0 (0.0)	6 (100.0)
	55-59	1 (12.5)	3 (37.5)	2 (25.0)	0 (0.0)	0 (0.0)	2 (25.0)	0 (0.0)	8 (100.0)
	Total	13 (10.7)	27 (22.1)	55 (45.1)	12 (9.8)	2 (1.6)	11 (9.0)	2 (1.6)	122(100.0)
Seniority	1-5	1 (10.0)	1 (10.0)	5 (50.0)	1 (10.0)	0 (0.0)	2 (20.0)	0 (0.0)	10 (100.0)
	6-10	2 (12.5)	6 (37.5)	8 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	16 (100.0)
	11-15	5 (16.7)	6 (20.0)	12 (40.0)	4 (13.3)	0 (0.0)	3 (10.0)	0 (0.0)	30 (100.0)
	16-20	1 (3.1)	8 (25.0)	13 (40.6)	5 (15.6)	2 (6.3)	1 (3.1)	2 (6.3)	32 (100.0)
	21-25	1 (5.0)	3 (15.0)	13 (65.0)	2 (10.0)	0 (0.0)	1 (5.0)	0 (0.0)	20 (100.0)
	26 and over	3 (21.4)	3 (21.4)	4 (28.6)	0 (0.0)	0 (0.0)	4 (28.6)	0 (0.0)	14 (100.0)
	Total	13 (10.7)	27 (22.1)	5 (45.1)	12 (9.8)	2 (1.6)	11 (9.0)	2 (1.6)	122(100.0)

that teachers mostly stated the sector of the game in all seniority ranges. The distribution of the answers given by the teachers to the question of, "Do you know about the benefits of implementing the metaverse platform in the field of education?" was given in figure 2.

Regarding the benefits of the metaverse platform in education, 69.7% of the teachers answered no, and 30.3% answered yes (Figure 2). The distribution of the answers given by the teachers to the question "Do you know about the benefits of implementing the metaverse platform in the field of education?" is given in table 7.

According to Table 7, mostly male teachers (36%) stated that they knew the metaverse applications in the educational environment. It has been observed that the age ranges that indicate that they have the slightest knowledge about the metaverse applications in the academic

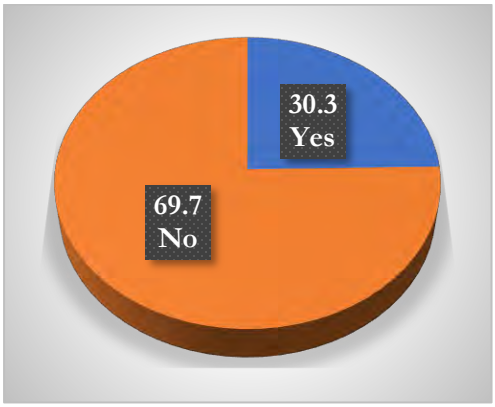

Figure 2 Distribution of teachers' answers to the question of the benefits of metaverse applications in the educational environment

Table 7 Distribution of teachers' answers to the question of "do you know about the benefits of implementing the metaverse platform in the field of education?"

		Yes	No	Total
Gender		Freq. (%)	Freq. (%)	Freq. (%)
	Female	19 (26.4)	53 (73.6)	72 (100.0)
	Male	18 (36.0)	32 (64.0)	50 (100.0)
	Total	37 (30.3)	85 (69.7)	122 (100.0)
Age	25-29	3 (75.0)	1 (25.0)	4 (100.0)
	30-34	4 (23.5)	13 (76.5)	17 (100.0)
	35-39	14 (32.6)	29 (67.4)	43 (100.0)
	40-44	10 (34.5)	19 (65.5)	29 (100.0)
	45-49	4 (26.7)	11 (73.3)	15 (100.0)
	50-54	0 (0.0)	6 (100.0)	6 (100.0)
	55-59	2 (25.0)	6 (75.0)	8 (100.0)
	Total	37 (30.3)	85 (69.7)	122 (100.0)
Seniority	1-5	3 (30.3)	7 (70.0)	10 (100.0)
	6-10	7 (43.8)	9 (56.3)	16 (100.0)
	11-15	10 (33.3)	20 (66.7)	30 (100.0)
	16-20	12 (37.5)	20 (62.5)	32 (100.0)
	21-25	3 (15.0)	17 (85.0)	20 (100.0)
	26 and over	2 (14.3)	12 (85.7)	14 (100.0)
	Total	37 (30.3)	85 (69.7)	122 (100.0)

environment are 100% to 50-54 years old and 75 to 55-59 years old. It was observed that 85.7% of the teachers who stated that they had little knowledge of the applications of a metaverse in the educational environment were teachers with a seniority of 26 years and above and between 85% and teachers with a seniority of 21-25 years. While it was seen that the teachers in the 25-29 age range were most knowledgeable about the applications of a metaverse in the field of education, it was seen that there were teachers with a seniority of 6-10 years, with 43.8%. The distribution of the answers given by the teachers to the question "What do you think is the most appropriate course type for the metaverse platform to be used in education?" was given in figure 3.

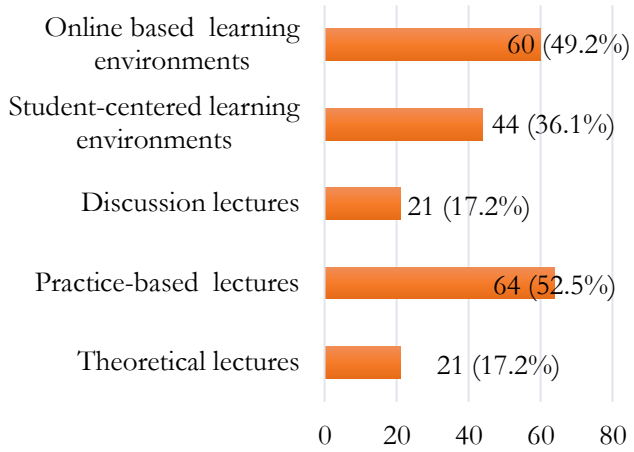

Figure 3 Distribution of the answers given by the teachers to the question of what is the most appropriate course type for the use of the metaverse platform in education

It was seen that the most suitable course type for the use of the metaverse platform in education was practice and practical courses with 52.5%, and the theoretical and discussion approaches at the lowest rate (17.2%) according to teachers. The distribution of the answers given by the teachers to the question of, "Would you like to hold seminars and workshops on metaverse applications in education?" was shown in figure 4.

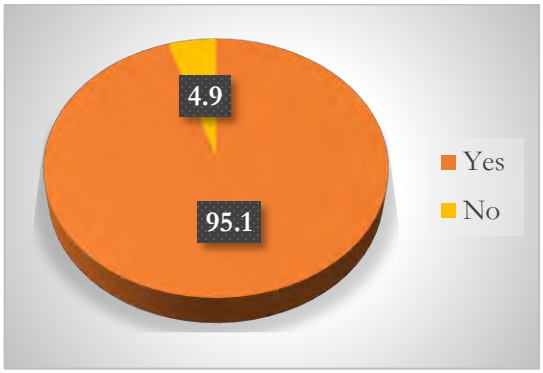

Figure 4 Distribution of the answers given by the teachers to the question would you like to hold seminars and workshops on metaverse applications in education

According to Figure 4, 95.1% of the teachers wanted seminars and workshops on metaverse applications in education, and 4.9% did not wish to attend symposia and seminars on the subject. Table 8 shows the teachers' "If there are any topics that you want to be discussed in workshops about metaverse, can you specify them?" the distribution of their answers to the question was given.

Providing introductory training that will introduce teachers to metaverse the most (17.2%), the applicability of the field of education (10.7%), ethical suitability of the subject (4.1%), benefits and harms (4.1%), content development (3.3%), It was seen that they wanted

Table 8 Distribution of teachers' answers to the question of if there are any topics that you want to be discussed in workshops about metaverse, can you specify them

Categories	*F*	*%*
Introduction	21	17.2
Applicability in education	13	10.7
Ethical compliance	5	4.1
Content development	4	3.3
Security	3	2.5
Infrastructure	3	2.5
Benefits and harms	5	4.1
Student Level	3	2.5
No	65	53.3
Total	122	100.0

workshops on infrastructure (2.5%), ensuring security (2.5%) and suitability for student level (2.5%).

4. CONCLUSION

This study was conducted to determine teachers' views of the metaverse concept and its applications. For this purpose, the following questions were asked: Do you know about metaverse applications?, How would you describe your level of knowledge about metaverse? Where did you first hear about the concept of the metaverse? Which application sector area of the metaverse did you hear the most? The most appropriate course for the use of metaverse platforms in education What type do you think? Would you like to hold seminars and workshops on metaverse applications in education? Which subjects do you think the metaverse platform can be more effective in the classroom environment?, If there are any topics you would like to be discussed in workshops related to the metaverse and metaverse platform, can you specify them?

It has been seen that most teachers know about metaverse and its applications, and male teachers have more knowledge about metaverse and its applications are more than female teachers. It was concluded that teachers expressed their knowledge level on metaverse mainly at the level of hearing and beginning. 57.4% of teachers said social media is the highest answer to the question of where you first heard about the metaverse concept. When examined in terms of gender and seniority, it was seen that teachers mostly listened to the idea of metaverse from social media. In this context, the result of the current study will contribute to studies on how social media can be included in the teaching process by both educators and program designers.

Among the application sector areas of the metaverse, games (~ 45%), economy (~ 22%), education (~ 11%), marketing (~ 10%), culture (9%), and health (~ 2%) were heard by teachers. Games are the most effective means of spending time today (Sarsar, Başbay & Başbay, 2015). This result can be interpreted as games can be effective in the education and training process, and more studies should be done on this subject. When we look at the age ranges and seniority variables in general, it is seen that of the metaverse application areas are mostly the sector of the game. It has been seen that most of the teachers answered no about the benefits of applying the metaverse platform in the field of education. Most of the teachers (95.1%) stated that they want to hold seminars and workshops about metaverse applications in education, stating that the most appropriate course type for the use of metaverse platform in education is practice and experiment-based courses with 52.5%. Most of the teachers who wanted workshops and seminars on the subject stated that they wanted to provide introductory training on the metaverse, the applicability of the metaverse to the field of education, the ethical suitability of the subject, its benefits and harms, content development, infrastructure, security and compliance with the student level.

Park, Kang, Kim & Lee (2022) examined experimental studies on the metaverse in education. And among the 32 studies examined, it was seen that the Minecraft (f = 10) platform was used the most among all studies, and the CoSpace Edu (f = 6) was used most frequently in Korea. And most of the studies on the metaverse (68.8%) included collaborative studies and discussions used as activities. One thing Minecraft CoSpaces Edu platforms have in common is that they provide an educational version. As a result of the study, it has been seen that the high frequency of use of an alternative platform and the provision of training services on the subject affect the choice of metaverse platform. This result is consistent with the conclusion that most of the teachers (95.1%) in the present study wanted to receive training on the metaverse.

In the study, in which the studies on the metaverse in education were examined bibliometrically (Tlili et al., 2022), when the distribution of the metaverse in the field of education was examined, it was seen that the fields in which the studies were mostly carried out were in natural sciences, mathematics and engineering (53%), general education (15%), arts and humanities (11%). In this respect, studies on the metaverse and its applications in the field of education will be important in terms of understanding the educational and instructional reflections of this new technology.

Metaverse platforms can be used as a teaching-learning method to increase the quality of education by crossing borders (Park, Kang, Kim & Lee, 2022). In this context, the current study conducted with teachers is important in terms of determining the first impressions of this technology in education and training. Based on the study results, introductory pre-service and in-service studies can be conducted for teachers and teacher candidates regarding the metaverse and its applications in the field of education and its possible benefits.

ACKNOWLEDGMENT

The authors acknowledge Mrs. Rika Rafikah for stimulating discussion about educational assessment

REFERENCES

Allen K.W., (2021). Metaverse: A Beginner's Guide to The New Digital Revolution. How to Invest in Cryptocurrency, NFT, Blockchain Gaming and Other Digital Arts Of The Future.

Balcı, A. (2012). *Sosyal bilimlerde araştırma (9. baskı) [Research in the social sciences (9th ed.)]*. Ankara: Pegem A Yayıncılık.

Ball, M. (2021). *Frameworkfor The Metaverse.* https://www.matthewball.vc/all/ forwardtothemetaverseprimer. Erişim: 03.02.2022.

Berkeley University. (2020, May 16). *Watch Blockeley, UC Berkeley's online Minecraft commencement*. https://news.berkeley.edu/2020/05/16/watch-blockeley-uc-berkeleys-online- minecraft-commencement/ adresinden 16.10.2022 tarihinde alınmıştır.

Bostancı, M., & Uncu, G. (2021). *Metaverse: Sanal mı gerçek mi?* Dijital İletişimi Anlamak-2. Palet Yayınları. PP (58-69).

Büyüköztürk, Ş. (2005). Anket geliştirme [Survey development]. *Türk Eğitim Bilimleri Dergisi, 3*(2), 133-151.

Carmona-Vickery, N. (2018, December). *Develop Education Apps with Metaverse.* https://www.medium.com/metaverseapp/develop-education-apps-with-metaverse-a40959 d8247e

Chauhan, S. (2017). A meta-analysis of the impact of technology on learning effectiveness of elementary students. *Computers & Education, 105,* 14-30. https://doi.org/10.1016/j.compedu. 2016.11.005

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches (3rd ed.).* Thousand Oaks, CA: Sage.

Damar, M., (2021). *Metaverse ve Eğitim Teknolojisi. Eğitimde Dijitalleşme ve Yeni Yaklaşımlar*. Efe Akademi.

Fraillon, J., Ainley, J., Schulz, W., Friedman, T., & Duckworth, D. (2019). *IEA international computer and information literacy Study 2018 assessment framework.* Amsterdam: IEA.

Gartner. (2022). *Gartner: A quarter of consumers will use the metaverse daily by 2026*. https://www.retaildive.com/news/gartner-a-quarter-of-consumers-will-use-the-metaverse-daily-by-2026/618474/ adresinden 15.10.2022 tarihinde alınmıştır.

Hai-Jew, S. (2010). *Virtual immersive and 3D learning spaces: Emerging technologies and trends.* USA: Igi Publishing.

Han, S. & Noh, Y. (2021). Analyzing Higher Education Instructors' perception on Metaversebased education. *Journal of Digital Contents Society, 22*(11), 1793-1806.

Jeon, J. & Jung, S. K. (2021). Exploring the educational applicability of Metaverse-based platforms. *Korea Association of Information Education.* 361-368.

Kang, J. K., Cho, K. H., Kim, S. B., & Choi, N. C., (2020). Artificial Neural Network Modeling for Prediction of Dynamic Changes in Solution from Bioleaching by Indigenous Acidophilic Bacteria. *Appl. Sci. 10*, 7569.

Karasar, N. (2010). *Bilimsel Araştırma Yöntemi (Scientific Research Method).* Ankara: Nobel Yayınevi.

Koşar, D., Er, E., Kılınç, A. Ç., & Koşar, S. (2017). Öğretmen liderliğine ilişkin yapılan çalışmaların incelenmesi: Bir içerik analizi [Examining the studies on teacher leadership: A content analysis]. *Inonu University Journal of the Graduate School of Education, 4*(7), 33-50.

Kye, B., Han, N., Kim, E., Park, Y., & Jo, S. (2021). Educational applications of metaverse: possibilities and limitations. *Journal of Educational Evaluation for Health Professions*, *18*.

MacCallum, K., & Parsons, D. (2019). Teacher perspectives on mobile augmented reality: The potential of metaverse for learning. *In* the *World Conference on Mobile and Contextual Learning* (pp. 21-28).

Masters, N. B., Shih, S. F., Bukoff, A., Akel, K. B., Kobayashi, L. C., Miller, A. L. & Wagner, A. L. (2020). Social distancing in response to the novel coronavirus (COVID-19) in the United States. *PloS one, 15*(9), e0239025. https://doi.org/10.1371/journal.pone.0239025

Mayer, R. E. (2019). Computer games in education. *Annual Review of Psychology, 70*. https://doi.org/10.1146/annurev-psych-010418-102744

Miles, M, B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded Sourcebook.* (2nd ed). Thousand Oaks, CA: Sage.

Mystakidis, S. (2022). Metaverse. *Encyclopedia*, *2*(1), 486-497.

Park, I., Kang, H., Kim, S., & Lee, Y., (2022). Review of Intervention Studies using Metaverse in Education. *Journal of Digital Contents Society. 23* (8), 1399-1412. http://dx.doi.org/10.9728/dcs.2022.23.8.1399

Park, S., & Kim, S. (2022). Identifying World Types to Deliver Gameful Experiences for Sustainable Learning in the Metaverse. *Sustainability*, *14*(3), 1361.

Patton, M. Q. (2018). *Nitel araştırma ve değerlendirme yöntemleri* (3. Baskı) *[Qualitative research and evaluation methods (3rd Edition*)]. (Çev. Ed. M. Bütün ve S. B. Demir). Ankara: Pegem Akademi Yayıncılık.

Reis, R. Escudeiro, P., & Escudeiro, N., (2010). *Comparing Social Virtual Worlds For Educational Purposes.* 10th IEEE International Conference on Advanced Learning Technologies. http://dx.doi.org/10.1109/ICALT.2010.57

Sarsar, F., Başbay, M. & Başbay, A. (2015). Öğrenme-Öğretme Sürecinde Sosyal Medya Kullanımı [The Use of Social Media in the Learning-Teaching Process]. *Mersin Üniversitesi Eğitim Fakültesi Dergisi, 11* (2). https://dergipark.org.tr/tr/pub/mersinefd/issue/17397/181901

Şenel, A., & Gençoğlu, S. (2003). Küreselleşen dünyada teknoloji eğitimi [Technology education in a globalizing world]. *Gazi Üniversitesi Endüstriyel Sanatlar Eğitim Fakültesi Dergisi*, *11*(12), 45-65.

SPRI (2021). *Metaverse Begins: 5 Major Issues and Forecast*. IS-116.

Stegmann, K. (2020). Effekte digitalen Lernens auf den Wissens- und Kompetenzerwerb in der Schule [Effects of digital learning on the acquisition of knowledge and skills at school]. *Zeitschrift für Padagogik, 2,* 174-190. https://doi.org/10.3262/ZP2002174

Stephenson, N. (1992). *Snow crash: A novel.* New York, NY, Bantam Books

Tlili, A., Huang, R., Shehata, B., Liu, D., Zhao, J., Metwally, A. H. S., ... & Burgos, D. (2022). Is Metaverse in education a blessing or a curse: a combined content and bibliometric analysis. *Smart Learning Environments*, *9*(1), 1-31. https://doi.org/10.1186/s40561-022-00205-x

Tokel, T. (2021, December 14). *Türk araştırmacılardan okulları "metaverse" ortamına taşıyan teknoloji [Technology that brings schools to the "metaverse" environment from Turkish researchers].* https://www.aa.com.tr/tr/bilim-teknoloji/turk-arastirmacilardan-okullari-metaverse-ortamina-tasiyan-teknoloji/2446867

U.S Department of Education. (2020). *Reimagining the role of technology in education. National Educational Technology Plan.*

Yeşilyurt, M., Kurt, T., & Temur, A., (2004). İlköğretim Fen Laboratuarı İçin Tutum Anketi Geliştirilmesi ve Uygulanması [Developing and Implementing Attitude Questionnaire for Elementary Science Laboratory]. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi, (16),* 104-114.

Yeşilyurt, M., Kurt, T., & Temur, A., (2005). İlköğretim Fen Laboratuarı İçin Tutum [Attitude for Elementary Science Lab]. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi, 17*(17), 21-31.

Yıldırım, A. & Şimşek, H. (2018). *Sosyal bilimlerde nitel araştırma yöntemleri* (11. Baskı*) [Qualitative research methods in the social sciences (11th Edition)]*. Ankara: Seçkin Yayıncılık.

Zuckerberg, M. (2021). *Founder's Letter.* Meta. https://about.fb.com/news/2021/10/found ers-letter/