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Metaverse Awareness of Turkish Generation Z Preservice Teachers

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Abstract

The aim of this study was to examine the metaverse awareness of Turkish Generation Z pre-service teachers with regard to several variables. A total of 1048 pre-service teachers born after 2000 participated in the study in which the descriptive survey model was used. The data were collected through a questionnaire and analyzed using descriptive statistical techniques. The findings revealed that the participants had low metaverse awareness and experience of this technology. Differing from the global Generation Z, they perceived the metaverse more in the context of game and entertainment. The participants thinking that the metaverse is partially beneficial for education emphasized its role as a technological tool that supports education rather than the role of the metaverse as an educational ecosystem itself. This finding may be related to the fact that the Turkish Generation Z preservice teachers were not fully aware of the virtual and digital technology phenomenon such as the metaverse and they were not aware of its educational potential. The low awareness of the T Turkish Generation Z preservice teachers about the metaverse can be considered as a deficiency in terms of compliance of the Turkish Education System with the Information Age. It was concluded as a result of this study that the awareness of Turkish Generation Z preservice teachers, who differ from their global counterparts in some features, about virtual and digital technology is not yet ready for the transformation of Turkish Education System to into a completely virtual and digital form. Thus, this unity should be ensured through intermediate forms such as the Hybrid Model.

Keywords: *Turkish Generation Z, Metaverse, Generation Z Preservice Teachers, Metaverse and Education.*

Öz

Bu araştırmanın amacı, öğretmen adayı Türk Z Kuşağının metaverse farkındalıklarını belirlemek ve bunları çeşitli değişkenlere göre değerlendirmektir. Betimsel tarama modelinde kurgulanan ve yürütülen araştırma, 2000 yılı sonrasında doğmuş toplam 1048 öğretmen adayı üzerinde yürütülmüştür. Araştırmada veriler, anketle toplanmış ve betimsel istatistiki tekniklerle analiz edilmiştir. Bu analizlere dayalı olarak ulaşılan sonuçlar şunlardır: Araştırmaya katılan öğretmen adaylarının metaverse farkındalıkları ile bu teknolojiyi deneyimleme oranları düşüktür. Bu özelikleriyle küresel Z kuşağından ayrışan Türk Z Kuşağı öğretmen adayları, metaverseyi daha çok oyun-eğlence bağlamında algılamaktadırlar. Metaverseyi eğitim için kısmen faydalı bulan öğretmen adayları, metaversenin bizatihi eğitim ekosistemi olma rolünden ziyade, eğitimi destekleyen teknolojik araç rolünü benimsemişlerdir. Araştırmada bu durum, Türk Z Kuşağı öğretmen adaylarının metaverse gibi sanal ve dijital teknoloji olgusunun tam ayırdında olmamaları ve bunun eğitim potansiyelini bilmedikleriyle ilişkilendirilmiştir Türk Z kuşağına mensup öğretmen adaylarının metaverse olgusuna dair düşük farkındalıkları, Türk Eğitim Sisteminin Bilgi Çağı eğitim paradigmasına uyumu bakımından eksiklik olarak görülebilir. Bazı boyutlarda küresel çağdaşlarından ayrışan Türk Z Kuşağı öğretmen adaylarının sanal ve dijital teknolojiye dair farkındalık düzeyleri, Türk Eğitim Sisteminin tamamen sanal ve dijital bir forma dönüştürülmesine henüz hazır olmadığı; dolayısıyla bu uyumun Hibrit Model gibi ara formlar üzerinden yapılmasının daha doğru olacağı şeklinde değerlendirilmiştir.

Anahtar Kelimeler: *Türk Z Kuşağı, Metaverse, Z Kuşağı Öğretmen Adayları, Metaverse ve Eğitim.*

Introduction

The metaverse phenomenon, fictional background of which is based on the books "Dungeons & Dragons" (1974), "Neuromancer" (1984) and Neil Stephenson's "Snow Crush" (1992), is a relatively new development in education (Lee, 2021; Damar, 2021). Metaverse, the advanced version of Augmented Reality (AR) based on a new generation internet technology (Hazneci, 2019; Duan et. al., 2021), is a three-dimensional (3D) virtual ecosystem (Kim, 2021). Etymologically, metaverse consists of the words 'meta' (abstract, virtual) and 'verse' (universe) and refers to "virtual universe" (Choi & Kim, 2017). Metaverse is a technological platform that combines real and virtual worlds (Göker, 2017). This platform consists of elements such as AR, avatar, Second Life, simulation, life diary and mirror worlds (Warburton, 2009), wearable techonologu such as vitual googles and sensor suits (Park and Kim, 2022), data warehouse and a 3D web infrastructure (Duan et al.., 2021). With this tools, the metaverse enables individuals to participate in a virtual ecosystem in which senses of sight, hearing and touch become possible through their virtual personality, that is their "avatar" (Lee, 2021). Such a situation possibly tranforms the relationship between education and technology into a very signicifant place.

In terms education, the metaverse goes beyond the role of technology that supports the teaching process and refers to an education ecosystem. Metaverse, which is a virtual education ecosystem, offers students great stimuli and messages, surpassing the time and place constraints. In this ecosystem, the student finds the opportunity to go through experiences that are not possible in the classical school and classroom environment (Choi & Kim, 2017). Thus, students can gain many experiences that they cannot have in real life because of different reasons whether individually or with a group (Yoo & Keung, 2021). Especially, students can participate in the learning content by creating and realizing their own fiction in the metaverse education ecosystem, in which they join with their avatar, which is a kind of hologram. Thus, the students have the opportunity to learn almost any subject they want, without time and place constraints, individually or with a group. With these features, it can be argued that the metaverse, which supports Constructivism (Avcı, 2017), is an education ecosystem suitable for the Generation Z, who is also familiar with the virtual and digital environment, due to the opportunity to combine entertainment and education in the virtual environment. Generation Z, who were born after 2000 and some of them are in the higher education age group (Kesgin, 2019), are called the learners of the digital age (Ardıç & Altun, 2017). In fact, this generation appears in almost 90% of new generation internet technologies, virtual and social media platforms and is extremely familiar with *gaming, chating and getting information* in these platforms (Taş, Demirdövmez & Küçükoğlu, 2017). In this respect, the metaverse ecosystem seems to match with the learning preferences of this generation. It is also clear that the existing education and teaching regulations do not appeal to this generation (Halisdemir, 2015). In this sense, a suitable and attractive educational environment in line with their virtual and digital communication habits should be provided to the Generation Z who constitutes approximately 14% of the population of Turkey (Deniz & Ünal, 2019). Furthermore, in this age, education cannot be thought in isolation from virtual and digital technologies, which reflect the spirit of the time. Existing in a world moving towards the Society 5.0 Smart Society, in which applications such the Metaverse will be included in all aspects of life, is possible by being aware of these technologies, being a user, and being the producer of these them. At this point, metaverse awareness of higher education students, especially the Generation Z, is of critical importance for the accommodation of future generations to the aforementioned smart systems since new generations will fail to adopt an innovation that their teachers are not aware of. Therefore, it is important for the Generation Z preservice teachers to be aware of the relationship between education and the metaverse, in terms of the adaptation of these and similar technologies to the education system.

The relationship between metaverse and education can be briefly regarded metaversal education (Akpınar & Akyıldız, 2022). The reason behind the appropriatness of metaversal education

for the Generation Z preservice teachers is that this generation exists in virtual media in ontological terms (Yardımcı, 2021; Taş, Demirdövmez & Küçükoğlu, 2017) and familiar with digital information in epistemological terms (Taşlıbeyaz, 2019). In this sense, the metaverse, which connects technology and Generation Z, can play a role in the education of this generation as an "epistemic-cognitive" (Tsai et all., 2013) and "ontological" stakeholder. With the new generation virtual and digital internet technology in education, the existing teaching process transforms into a metaverse education ecosystem. This transformation lead to many new situations and contexts in education and learning. In the timeless, spaceless and virtual metaverse education ecosystem, the school transfomrs into a decentralized ecosystem (Duan et al., 2021), the student into the avatar, and the teacher into a moderator (Akpınar & Halitoğlu, 2022). Similarly, learning transforms from a stimulus-response (S-R) process to a digital information/stimulus-avatar (DS-A) relationship in the metaverse education ecosystem. As a result of these transformations, it is expected that there will be changes in the currents ontological and epistemological meanings of education. Although this virtual educational environment, which goes beyond the known and familiar meanings, contexts and relationships in education and learning, is not suitable for the Generation Y and X, this is not valid for the Generation Z, who were born into internet technology and mental schemas of whom were formatted with virtual and digital stimuli. Therefore, recognizing the Generation Z from many dimensions, including education is of crucial importance.

The concept of generation comes from the words “generire” in Latin (Halisdemir, 2015). In order to address and examine the generation phenomenon scientifically, classifications were made in the sociological context. In the classification of generations, the factors and characteristics that distinguish one generation from the others are considered. These factors are historical, social, political and economic events that have an impact on the course of life (Erden, 2012; Kesgin, 2019). As a result of these events, the course of life is changed on average every 20-30 years (Adıgüzel, Batur, & Ekşili, 2014) and a new generation with common behavioral patterns that are different from the previous ones emerges. Hence, the generation can be described as a group that shares certain social, economic and political events in relation to certain birth years (Gürbüz, 2015). Members of the same generation are expected to have common habits and values (Taş, Demirdövmez, & Küçükoğlu, 2017). Based on this definition, the generations in our century are listed as follows: Silent Generation (1927-1945), Baby Boomer (1946-1964), Generation X (1965-1979), Generation Y (1980-1999) and Generation Z (2000 and after) (Deniz & Tutgun Unal, 2019:1028).

In recent years, the technology has regarded as one of the factors in generation classification. Washburn (2000) explains the match between generation and technology as follows: Baby Boomers - phone; Generation X - TV; Generation Y – the Internet and e-mail (cited in Erden, 2012). From this perspective, Generation Z can be matched with virtual and digital technology. Therefore, the internet technology is the dominant factor that charactarize Generation Y and Generation Z (Kesgin, 2019; Fettahlıoğlu, Birin, & Yıltay, 2018). However, the difference between generations is that while the Generation Y uses the internet mostly for communication and information, internet-based virtual and digital technologies and social media are an area of existence for the Generation Z. This means that although the internet is a tool for communication, perception and learning for the Generation Y, the internet is almost a living space for the Generation Z. Based on this relationship, even though the internet plays a supportive role in the communication, perception and learning of the Generation Y, the internet is both an ontological and an epistemic living area and environment for the Generation Z, who is integrated with this technology. In the context of the integration of Generation Z with the internet technologies, Duan et al. (2021) define the relationship between Generation Z and the internet as "human-centered informatics". The fact that the members of

Generation Z were born after the year 2000, when internet-based virtual and digital technologies were widespread, plays a crucial role for them to be the internet generation. In fact, these technologies and stimulations have a great effect on the mental coding of the Generation Z on which their perception, thinking and learning are based. In line with this argument, Ardıç and Altun (2017) reported that the Generation Z uses technology for information and learning purposes. Similarly, Zapalska and Brozik (2006) highlighted the fact that the mental processes of the Generation Z operate differently as a result of technology (cited in Erden, 2017). The Generation Z is actually innate screen learners since their cognitive functioning operares according to the neurological bombardment full of digital and virtual messages (Karadoğan, 2019). As Artkan and Kaya (2021) indicate, the Generation Z, today's higher education students, are visual and image-oriented learners with a perception style facilitated by multiple visual flows and instant information. Therefore, it is important to understand the relationship this generation has established with new generation internet technologies such as the metaverse from their perspective. However, the number of studies on this issue is very limited (Akça, 2016). In this sense, this study, the aim of which was to investigate the metaverse awareness of Generation Z preservice teachers, who will build the future with the students they will train, will contribute to the literature.

Method

Research Model

This study, which aimed to examine the metaverse awareness of Turkish Generation Z preservice teachers, adopted the survey model which is one of quantitative research models. The survey model is suitable for research conducted on large samples, in which the views, skills, interests and attitudes of the participants regarding an event or subject are observed and described in accordance with the purpose of the research in social and human disciplines (Karasar, 2018).

Universe (Population) and Sample

The universe of this research consisted of 1977 students studying in the 1st and 2nd grades of the Fırat University Faculty of Education (n=965) and Dicle University Faculty of Education (n=1012) in the 2021-2022 academic year. A total of 1048 1st and 2nd grade students who were born in and after 2000 participated in the study. In the study, convenience sampling, a purposive sampling method, was used and the participation was on a voluntary basis. In convenience sapling, a sample that is easy to access is included in the study in order to enhance speed and practicality to the study (Patton, 2005; Yıldırım & Şimşek, 2008). Based on the fact that a sample of 351 participants is sufficient for the population size of 4000 people according to the confidence level of ".95" (Balcı, 2009), it can be argued that a sample of 1048 people is sufficient to represent the population. The demographic characteristics of the are presented in Table1.

Table 1. The demographic characteristics of the participants

Variables		f	%
Gender	Female	736	70,2
	Male	312	29,8
University	Dicle	616	58,8
	Fırat	432	41,2
Department	Verbal	522	49,8
	Quantitaive	332	31,7
	Foreign Language	194	18,5
Time spent on the Internet	1 hour	113	10,7
	2 hours	176	16,8
	3 hours	315	30,1
	4 hours and more	444	42,4
Course taken on Information and Communication Technologies.	Yes	960	91,6
	No	88	8,4

Data Analysis

In this study, the data were collected through the "Metaverse Awareness Questionnaire of Turkish Generation Z" (MAQTGZ) developed by the researchers. During the development of the questionnaire, first, a draft pool of 36 items was developed through a literature review. Then, opinions of 31 students (Fırat University n=17; Dicle Universities n=14), who were 1st and 2nd grade students studying at the Education Faculties of Fırat and Dicle Universities in the Spring Semester of the 2021-2022 Academic Year, about these draft items were obtained. Similarly, expert opinion about the draft items was obtained from

six academicians (2 Prof. Dr, 2 Assoc., Prof. and 2 Assis. Prof.) working in the Department of Educational Sciences, Curriculum and Instruction of these two faculties. In line with the received feedback, the items in the draft form were examined in terms of relevance to the research topic, clarity and comprehensibility, and 1 item related to demographic information and 6 items related to metaverse awareness were eliminated. Thus, MAQTGZ included a total of 35 items, five of which are about personal information and 30 of which are related to the aim of the study. In MAQTGZ, 30 items related to metaverse awareness were graded as "3 Yes", "2 Partially" and "1 No". After obtaining the necessary permissions for the study, a total of 1200 forms were administered to 1st and 2nd grade students of the aforementioned faculties. After the two-week application period, 1067 questionnaires were returned. 19 of them were eliminated due to incomplete filling, duplicate marking, etc., and the remaining 1048 questionnaires were entered to SPSS package program for data analysis. Frequency and percentage, which are descriptive statistical techniques, were used in the analysis of these data. In addition, Chi-square test was used in the analysis of students' opinions with regard to demographic variables. Before the Chi-square test, the normality of the data was tested. Fisher test for values less than "5" in each cell in the distribution; The Chi-square test (Karagöz, 2016) was applied to the data where more than this distribution was accepted as normal, to determine whether the frequencies obtained were compatible with a certain hypothesis or theoretical distribution or whether they were different. The Fisher's test was applied to each cell in the distribution for values less than "5", and where the distribution was considered normal, the Chi-square test was applied to the data to investigate whether the obtained frequencies satisfied a certain hypothesis or theoretical distribution or whether they were different (Karagöz, 2016). p=0.05 was accepted as the level of significance.

Findings and Discussion

1. Opinions of Turkish Generation Z Preservice Teachers on the Metaverse Phenomenon

1.1. Metaverse Awareness

The opinions of the participants on metaverse awareness are given in Table 2.

Table 2. The participants' opinions about metaverse awareness

No	Opinions	Yes		Partial		No	
		f	%	f	%	f	%
1	Do you know the meaning of the term "metaverse"?	218	20.7	229	21.8	601	57.5
2	Do you know the structure and function of Metaverse technology?	140	13.4	287	27.4	621	59.3
3	Do you know which technological devices the metaverse covers?	126	12.0	256	24.4	666	63.5
4	Do you know how to participate in the metaverse environment on the Internet?	98	9.4	193	18.4	757	72.2
5	Do you know the headset and glasses that give the feeling of seeing and looking around in the virtual environment?	183	17.5	352	33.6	509	48.9
6	Do you know the gloves that give the feeling of touch in the virtual environment?	173	16.5	274	26.1	601	57.3
7	Do you know that Facebook changed its name to "Meta"?	363	34.6	157	15.0	528	50.4

In the Information Age, virtual and digital technologies have important indications on education as well as daily life. According to Avcı (2017), who cited various sources (Dalgarno & Lee, 2010; Papachristos, Vrrellis, Natsis & Mikropoulos, 2014 cited in Avcı, 2017), the metaverse, which has been described as a new generation internet-based virtual and digital ecosystem in the decade, has a significant potential for education. As in numerous countries, the metaverse-like 3D virtual ecosystem, which has been implemented as a virtual campus and virtual classroom in Turkey, is likely to be one of the educational environments of the future (Bartle, 2003, cited in Avcı, 2017). Besides, an education, structured on the basis of 3D virtual and digital technologies, is suitable for the Generation Z, which is called the digital generation. However, the adaptation of an education system to these technologies depends on the awareness, attitudes, knowledge and skills of the current Generation Z preservice teachers.

In this context, Table 2 showed that the participants had lower levels of awareness about the metaverse, which is a combination of 3-D virtual and digital technology. It was revealed that the participants were hardly aware of the concept of metaverse, its structure and function, the devices in this ecosystem and how to participate in this system. This finding clearly showed that the participants did not have an adequate knowledge of the metaverse. Krumsvik (2008) argues that teachers' digital competence lies at the intersection of awareness and practice skills (cited in Bayrakçı, 2020). The only topic that the participants were relatively aware of was that Facebook's name was changed to "Meta" (34.6% Yes; 15% Partially). The possible reason for this finding may be that they are the social media generation and the social media is the area of existence of the Generation Z (Yardımcı, 2021). On the other hand, it was found that the participants "partially" aware of the metaverse, its structure and function, the devices in this technology, and the use of the system. This finding indicates that the participants' metaverse knowledge was at the surface level. This may be due to the fact that the metaverse phenomenon has not yet been satisfactorily included in Turkish Education System (TES) and that there are not enough courses and activities for metaverse in the education faculties of the participants. The low awareness of the participants about the metaverse, which is a combination of virtual and digital technology, differentiates them from the global Generation Z. In general, it is stated that the Generation Z has a higher level of awareness about these technologies (Çavuşoğlu & Yalçın, 2021).

Chi-square (X^2) test was performed to examine whether there was a significant difference between participants' opinions regarding the items in Table 2 with regard to demographic variables. The findings showed that there was no significant difference between the participants' opinions according to grade, age and course taken on information and communication technologies. However, it was found that the participants significantly differed by gender in Item 2 ($X^2(df=2)=12.800$; $p=0.002$) and Item 7 ($X^2(df=2)=9.004$; $p=0.011$). Accordingly, female participant (No 62.1%; n=457) had less knowledge of the structure and function of the metaverse than males (No 52.6%; n=164). Similarly, male participants had higher levels awareness (Yes 39.4%; n=123) about the fact that Facebook changed its name to "Meta than that of females (Yes 32.6%; n=240). This finding, which indicated that male participants had a higher awareness about the metaverse, may be due to the fact that males use the internet technologies more intensively (Koçak, Karakuş, Yılmaz & Göktaş, 2018). In addition, there was a significant difference between the opinions of the participants in Item 5 ($X^2(df=4)=25.630$; $p=0.000$) and Item 7 ($X^2(df=4)=26.400$; $p=0.000$) in terms of the department. In this sense, participants at the quantitative departments (Yes 48.4%; n=148) had more knowledge about the virtual helmet and glasses required for the metaverse than those at the verbal departments (Yes 25.2%; n=77). This finding may be due to the fact that digital branches are more closely related to technology in general. However, the awareness of participants about the change of Facebook's name to "Meta" at the verbal departments (Yes 51.2%; n=186) were higher than those at quantitative (Yes 27.0%; n=98) and language departments (Yes 21.8%; n=79). The reason for this finding may be that verbal departments are more sensitive to the latest news. For example, Can and Gündüz (2021) found that

virtual classroom proficiency of classroom teachers was higher than those of branch teachers. In terms of the variable of time spent on the internet, there was a significant difference between the opinions of the participants in Item 1 (X^2(df=6)=16.720;p=0.010). It was found that the participants who spend 4 hours a day on the Internet (Yes 30.0%; n=133) were more aware of the meaning of the metaverse concept than those who spend 1 hour a day (Yes 21.6%; n=38). This may possibly be due to the interest in the Internet and familiarity with these technologies.

1.2. Metaverse Experience

The opinions of the participants about experiencing the metaverse are presented in Table 3.

Tablo 3. Opinions of generation Z preservice teachers on metaverse experience

No	Opinions	Yes		Partially		No	
		f	%	f	%	f	%
8	Have you had any experience of participating in the metaverse environment?	81	7.7	113	10.8	854	81.5
9	Have you experienced playing games in the metaverse environment?	100	9.5	91	8.7	857	81.8
11	Have you created your own avatar in the metaverse environment?	57	5.4	66	6.3	925	88.3
12	Have you experienced the virtual headset and glasses in the metaverse environment?	70	6.7	58	5.5	920	87.5
13	Have you tried the haptic gloves in the metaverse environment?	36	3.4	65	6.2	947	90.4

Being aware of the metaverse, which has a very abstract meaning and complex structure, requires experiencing this technology as well as knowing about it. Table showed that the Generation Z participants did not have metaverse experience at all. Considering their lower levels of metaverse awareness, such a finding is expected. Being competent in a topic requires both information (knowledge) and experience (skill) since they are significant behavioral stages that complement each other. In this sense, Lichtenberg, Woock, and Wright (2008) argue that success in the 21st century depends on both the development of knowledge and skills (cited in Saçmalıoğlu, 2019). The participants' lack of metaverse experience may be due to several reasons. The first is that Turkish Generation Z has not yet become skilled at new generation internet technologies such as metaverse. Second, the Turkish Generation Z is the consumer of internet technologies instead of the producer. However, regardless of the reason, it was revealed that the Turkish Generation Z differed from its global contemporaries in some aspects such as being knowledgeable about technology. This finding indicates that the argument that "generations all over the world have become similar to each other with globalization" (Görmez, 2021) does not fully reflect the current situation in Turkey. There are technological as well as sociological reasons for this.

Chi-square (X^2) test was performed to examine whether there was a significant difference between the opinions on the items in Table 3 with regard to demographic variables. The findings showed that there was no significant difference between the participants' opinions in terms of grade, age and course taken on Information and Communication Technologies. However, it was found that there was a significant difference in item 9 with regard to gender (X^2(df=2)=10.370; p=0.006). Male participants (Yes 13.1%; n=41) had more experience of playing games in the metaverse environment than females (Yes 8.0%; n=59). Although the rate was low, the fact that male teacher candidates had more virtual gaming experience may be related to the gender role. In addition, a significant difference was found in Item 11 (X^2(df=4)=23.020; p=0.000) and Item 12 (X^2(df=4)=13.040; p=0.011) in terms of department. It was found that the participants at quantitative

departments (Yes 491.2%; n=28) had more experience in creating avatars than those at verbal (Yes 26.3%; n=15) and language (Yes 24.6%; n=14) departments. Similarly, the participants at quantitative departments (Yes 44.3%; n=31) had more experience about the virtual headset and glasses than those at language (Yes 30.0%; n=21) and verbal (Yes 25.7%; n=18) departments. These findings suggests that the participants at quantitative departments are better in creating avatars and experiencing the virtual headset and glasses, which play a crucial role in the metaverse, than those at the verbal and language departments. With regard to the time spent on the Internet, there was a significant difference in Item 9 (X^2(df=6)=14.230; p=0.027). In this sense, the participants who spend 4 hours a day on the Internet (Yes 11.3%; n=50) had more experience of playing games in the metaverse than those who spend 2 hours on the Internet (Yes 5.1%; n=9). This finding indicates a linear relationship between the time spent on the internet and the metaverse experience. This finding is in line with the study of Doğruluk (2017) in which a relationship between the internet habits of pre-service teachers and their effectiveness in these platforms was found.

1.3. Metaverse Usage Areas

The opinions of Turkish Z Generation preservice teachers in the study on the metaverse usage areas are shown in Table 4.

Table 4. Opinions of the participants on metaverse usage area

No	Opinion	Yes		Partially		No	
		f	%	f	%	f	%
19	Do you agree that the metaverse is more suitable for virtual games/entertainment?	248	23.7	434	41.4	366	34.9
20	Do you agree that metaverse is more suitable for economy/cryptocurrency?	205	19.6	444	42.4	399	38.1
21	Do you agree that metaverse is more suitable for defense and security?	157	15.0	450	42.9	441	42.1
22	Do you agree that metaverse is more suitable for social communication and interaction?	238	22.7	421	40.2	389	37.1
23	Do you agree that metaverse is more suitable for education and training?	188	17.9	464	44.3	396	37.8

Metaverse represents the latest point reached by digital and virtual technologies, which have already surpassed the traditional game and entertainment purposes and turned into a life form (Şahin, 2016). In addition, today it has entered many fields from economy to security, and education to health. The opinions of the participants about the usage areas of metaverse are presented in Table 4. The findings showed that the Turkish Generation Z preservice teachers in this study perceived the metaverse mostly in the context of game-entertainment (Yes 23.7%; n=248), followed by social communication and interaction (Yes 22.7%; n=238), economy/cryptocurrency (Yes 19.6%; n=205), education (Yes 17.9%; n=188) and defense-security (Yes 15.0%; n =157), respectively. This finding suggests that Turkish Generation Z preservice teachers had surface level knowledge of metaverse. However, although the metaverse, the combination of new generation internet technologies, started in the context of games and entertainment (Gennett, 2010), it has gone far beyond this purpose. Even, it is proposed that metaverse-like technologies will have global effects in the economic, political and social fields and will transform the Z generation into global citizens (Ardıç & Altun, 2017). The inadequacy of the participants in metaverse usage areas is a lack of adaptation of TES to a technology-based Smart Society such as Industry 5.0. Therefore, the programs of education faculties should be revised in order to include and pay more attention to these technological developments.

Chi-square (X^2) test was used to investigate whether there was a significant difference between the opinions of the participants regarding the items in Table 4 in terms of demographic variables. The findings did not reveal a significant difference between the participants' opinions with regard to the class, age, course taken on Information and Communication Technologies and department. However, it was found that there was a significant difference in Item 20(X^2(df=2)=16.720; p=0.006) and Item 21 (X^2(df=2)=9.318; p=0.009) in terms of gender. Accordingly, male participants (Yes 26.9%; n=84) thought that metaverse is more suitable for the economy-crypto-money context than females (Yes 16.4%; n=121). Similarly, male participants (Yes 19.9%; n=62) considered the defense-security context of the metaverse more than females (Yes 12.9%; n=95). The reason for these findings may be that male preservice teachers are more sensitive to the issues of economy and defense-security in

terms of their gender role. In addition, There was a significant difference in Item 19 ($X^2(df=6)=20.190$; p=0.003) with regard to the time spent on the internet. Accordingly, the participants who spend 4 hours a day on the Internet (Yes 29.3%; n=130) though that metaverse is more suitable for virtual games and entertainment than those who spend 1 hour on the Internet (Yes 14.2%; n=16). This finding indicates that the time spent on the internet and the type of activity have an influence on the perception of the metaverse. In this sense, it can be anticipated that pre-service teachers who spend 4 hours a day on the Internet most likely participate in games and entertainment activities. The study of Kırnık, Pepeler, and Özbek (2018) also supports this argument. In this sense, Christakis, Ebel, Rivara, and Zimmerman (2004) argued that there was a significant increase in the time children spend on computer games in the last 30 years (cited in Uluyol, Demiralay, Şahin, & Eryılmaz, 2014).

1.4. The relationship between Metaverse and Education

The opinions of the participants on the relationship between metaverse and education are presented in Table 5.

Table 5. Opinons of generation Z preservice teachers on the relationship between metaverse and education

No	Opinion	Yes		Partially		No	
		f	%	f	%	f	%
16	Do you know that the metaverse is used in education?	192	18.3	308	29.4	548	52.3
17	Is it useful to use the metaverse for education?	360	34.4	424	40.5	264	25.2
18	Is the distance education you receive during the pandemic considered as a metaverse?	144	13.7	479	45.7	425	40.6
24	Do you agree with the view that Metaverse is the way children in our age learn?	201	19.2	442	42.2	405	38.6
25	Do you think that students learn by themselves without a teacher in the virtual environment?	172	16.4	475	45.3	401	38.3
26	Do you think it is correct for students to learn by themselves in the virtual environment?	160	15.3	439	41.9	449	42.8
27	Do you agree that there is no need for face-to-face education at school with the development of the Internet?	118	11.3	330	31.5	600	57.3
28	Do you agree that it is more appropriate to use the internet and virtual environment to support education at school?	389	37.1	384	36.6	275	6.2

Today, virtual and digital technological applications such as the metaverse have exceeded the context of games and entertainment and have reached a point where they offer a number of opportunities for education, especially language teaching (Ulaş, 2013; Demirbağ, 2020). An extensive body of literature has developed on the educational potential of these technologies (Pamukçu & Çakır, 2020; Şahin, 2016; Yıldırım, 2013). Now, it is predicted that metaverse-like ecosystems will be an integral part of education in the near future, depending on the required infrastructure and hardware facilities. Table 5 shows participants' opinions on the relationship between metaverse and education. It was found that the participants regarded the metaverse useful for education and training (Yes 34.4%; Partially 40.5%). However, considering the rate of acceptance, it can be put forward that they had a *cautious optimism* that the metaverse is beneficial for education. This may be as a result of the fact that the participants were not fully aware of the metaverse and did not have experience, as revealed in the study (Table 2, Table 3). In fact, the fact that the participants considered the role of the internet and virtual environment as "supporting education at school" (Yes 37.1%; Partially 36.6%) supports this argument. However, although the internet played this role before the metaverse (Koçer & Aydın, 2019), as the new generation internet technology, the metaverse have gone beyond this role and started to act as an alternative education ecosystem (Duan et al., 2021). In addition, the lower rates of participants' agreement to the items in Table 4 supports that they are not yet ready for metaverse education. Similarly, the fact that 57.3% of the participants said "No" to the statement that "There is no need for face-to-face education at school with the development of the Internet" indicates that they are not fully ready for virtual education. Accordingly, it can be anticipated that it is uncertain that teachers adopt the transformation of education into a completely virtual and digital structure in Turkey, thus Hybrid Models that combine traditional face-to-face education and

virtual education are more accepted (Koç-Akran, 2021).

Chi-square (X^2) test was performed to examine whether there was a significant difference between the opinions of the participants regarding the items in Table 5 in terms of demographic variables. The findings did not reveal significant difference between the participants' opinions with regard to the grade, age, course taken on Information and Communication Technologies, department and time spent on the internet. However, it was found that the participants significantly differed by gender in Item 27 ($X^2(df=2)=14.030$; $p=0.001$). Accordingly, male participants (Yes 14.7%; n=46) agreed the statement that "there is no need for face-to-face education at school with the development of the Internet" more than females (Yes 9.8%; n=72). This finding may be associated to the higher digital literacy levels of male teacher candidates. In line with this finding, Yeşildal (2018) and Acar (2015) reported that men had higher digital literacy levels.

Conlusion and Recommendations

In this study, the aim of which was to examine the metaverse awareness of the Turkish Generation Z preservice teachers with regard to various variables, the following results were obtained. These results were achieved from the opinions and the related literature of the 1st and 2nd grade Turkish Generation Z preservice teachers since they were born in 2000 and later (Kesgin, 2019; Savaş & Karataş, 2019). The studies outside Turkey indicated that the most distinctive feature of the Generation Z from is that they have an internet technology-mediated lifestyle (Şahbaz, 2019; Ardıç & Altun, 2017; Fettahlıoğlu, Birin & Yıltay, 2018). Whether this global feature of Genaration Z is valid for the Turkish Generation Z is controversial due to socio-cultural reasons and the prevalence of internet technology in Turkey. In this context, this study primarily investigated the awareness of Turkish Generation Z on metaverse, which is a combination of new generation internet technologies that forms their ontological and epistemological background (Tsai et al., 2013) since the awareness is the first requirement of knowing and using the technology (Çavuşoğlu & Yalçın, 2021). Accordingly, it was found that the metaverse awareness of Turkish Generation Z preservice teachers was insufficient. It was even lower among female participants, those at the verbal departments and those who spend less time on the Internet. This may be a significant feature that distinguishes the Turkish Generation Z form its global counterparts. However it is an important shortcoming in terms of benefiting from the educational potential of the metaverse. In the near future, it is expected that metaverse-like virtual and digital technologies, which have the potential to offer unique experiences for learning, contribute greatly to education and transform traditional education (Dickey, 2005; Sheehy, Ferguson & Clough, 2007 cited in Demirbağ, 2020). The low metaverse awareness of the Turkish Generation Z preservice teachers in this study may be due to the fact that the education faculties are not yet fully ready for the new generation internet technology in terms of infrastructure and hardware. However, regardless of the reason, this can be considered as a deficiency for the compatibility of TES with the virtual and digital technology-based 21st century education paradigm. For Turkey's adaptation to virtual and digital technologies-based education in the future, preservice teachers should be introduced with new generation internet technologies such as metaverse and Second Life (Ulaş, 2013), which have significant educational potential, as in the example of METU (Tokel, 2022). The applications such as Second Life (Şahin, 2016), 3D MUVE (Yıldırım, 2013) and Collaborative Virtual Environment (Yıldız, Çalıklar, Koç, & Şimşek, 2016) under the umbrella of metaverse are said to contribute to the academic and affective development of preservice teachers. As in these application, abstract environment such as the metaverse, which is an imaginary space (Kayapa, 2010), can be gained through education that includes abstract mental activities as in the examples.

It was also found in this study that the Turkish Generation Z preservice teachers also had low metaverse experiences. It was also lower among female participants, those at the verbal departments and those who spent less time on the Internet. Considering that knowledge and skill are two outcomes complementing each other in

education, this situation is expected. In this respect, the very low metaverse experience of the participants may be related to the lack of knowledge on metaverse and the prevalence of these environments in Turkey. In this sense, Kuru and Yılmaz (2018) reported that "teachers who know digital technologies can apply them with help", which shows that teachers have problems in practicing virtual and digital technologies. Therefore, it is recommended that environments where all Generation Z students, including preservice teachers and university students, experience virtual and digital technologies should be provided.

Participants experienced the metaverse mostly in playing games even if it was very low as 9.5%. This finding indicates that the Turkish Generation Z preservice teachers in this study, have a little experience of virtual and digital ecosystems because they are not fully aware of these technologies. Therefore, it can be put forward that the participants could not go beyond experiencing the game, which is the early development stage of the metaverse (Çavuşoğlu & Yalçın, 2021). The first appearance of the metaverse, which has a history of almost 25 years, was in the context of games and entertainment, and its emergence in many fields, including education, have taken place in the last decade (Erkılıç & Dönmez, 2020). Hence, it can be said that Turkish Generation Z preservice teachers differ from their global contemporaries in terms of metaverse experience and being aware of new generation internet technologies. This may be due to the fact that Turkish Generation Z preservice teachers are not fully under the global virtual and digital technology hegemony. In addition to socio-cultural and geographical factors, technological factors also play a crucial role in this disintegration (Kesgin, 2019) because the main distinguishing factor of the Generation Z is the intensive use of internet technology (Kul, 2019; Kesgin, 2019). Since the preservice teachers are the teachers of the future, these findings can be regarded as a shortcoming in terms of adaptation of TES to the virtual and digital education ecosystem. On the basis of the findings of this study, it is recommended that courses and activities about virtual ecosystems should be included to the curricula of education faculties since the teachers who will take part in virtual and digital technology-based education in the future will need to have technology-pedagogy-content knowledge together (Tatlı, Akbulut, & Altınışık, 2016: 660). Virtual campus, virtual library and virtual classrooms constitute some of good examples. Furthermore, traditional education practices are inadequate for the Generation Z (Şahin, 2016). The fact that Turkish Z generation teacher candidates have "digital wisdom" with virtual knowledge and skills (Savaş & Karataş, 2019) is of critical importance in terms of moving future generations from "using the technology of the age to being the producer of them" (Ardıç & Altun, 2017).

In terms of the usage areas of the metaverse, the participants mostly matched metaverse with game and entertainment which was followed by social communication and interaction, economy/cryptocurrency, education-training and defense-security, respectively. Male participants associated metaverse with economics and defense matching more than female participants. However, since the participants were preservice teachers, they were expected associate the metaverse with education. The failure to meet this expectation may be due to the fact that the participants were not very aware of the relationship between metaverse and education. This may be as a result of the participants' access to virtual and digital technologies (Yılmaz, 2019) and the time they spend on the internet (Yılmaz, Şahin, & Akbulut, 2016). In this regard, Çelik and Bindak (2005) reported that access to technologies affects perception and attitude towards them. On the other hand, the very low agreement to all of the items in Table 5 (23.7%-15.0%) indicates that the Turkish Generation Z preservice teachers in this study did not have sufficient knowledge about the metaverse, especially its usage areas.

In the context of the relationship between education and the metaverse, it was found that the Turkish Generation Z preservice teachers thought that the use of the metaverse in education was *partially* beneficial. The cautious optimism of the participants may be due to their unawareness of

the educational potential of the metaverse phenomenon. The fact that they partially related distance education to the metaverse showed that they were not fully aware of the metaverse phenomenon. In this vein, similar studies reported that pre-service teachers used virtual and digital technologies more for games, music, communication, less for learning and education, and their digital perceptions were low (Tonbuloğlu, 2017; Coşkun, 2016). In addition, the fact that the participants regarded the virtual environment, which is another expression of the metaverse, as supportive tool in education indicates that they consider the metaverse as a phenomenon that supports the educational environment. This may be interpreted as that that participants were not fully aware of and did not adopt the role of the metaverse as education ecosystem (Kim, 2021). However, despite the cautious attitudes of the participants (males were more optimistic), it should be noticed that they partially agreed the items such as the metaverse is a "contemporary" and "self-learning way" and "the metaverse is beneficial for education ". Therefore, it can be put forward that the Turkish Generation Z preservice teachers in this study were open to similar virtual and digital technological innovations, even if they did not know the meaning, educational role and scope of the metaverse. Hence, it is recommended that education faculties provide opportunities for these innovative attitudes of the Turkish Generation Z preservice teachers.

In sum, this study revealed that T the Turkish Generation Z preservice teachers had a cautious positive opinion of the metaverse, by partially agreeing the statements about the meaning, structure, function, educational potential, scope and role of the metaverse phenomenon. Based on the findings of this study, it can be concluded that it would be more appropriate to adopt a gradual course such as the Hybrid Model in the adaptation of TES to new generation virtual and digital technologies such as metaverse.

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