

## Metaverse Awareness and Generation to Transform Education

**Aylin Tutgun-Ünal**<sup>1</sup>

Üsküdar University, Faculty of Communication İstanbul, Türkiye

**Nevzat Tarhan**<sup>2</sup>

Üsküdar University, Faculty of Medicine İstanbul, Türkiye

**Abstract:** The effects of new media have been discussed in the field of education as in every field, and it has been stated in studies that it increases motivation when used in education. Nowadays, with the change of Facebook's name into "Meta", discussions of Metaverse as a Web 3.0 technology have started. Understanding the concept of Metaverse, which means Virtual Universe, is important for educators to understand the subject and design new instructional models. In this study, it is aimed to examine the transformation of education with the metaverse awareness and metaverse generation. The literature was searched with the document analysis technique and the subject was discussed with the titles of 'The Concept of Metaverse', 'Metaverse and Education', 'Metaverse Awareness' and 'Transformation of Education with the Metaverse Generation'. As a result, in an educational environment without huge campuses or buildings, it is expected that the education of the metaverse generation will take a completely different turn with the haptic clothes that will provide the feeling of touch in the virtual metaverse world. In this direction, it is important that the Metaverse awareness is formed correctly in these days, which are preparing the ground for transformation in education.

**Keywords:** Metaverse, Metaverse Awareness, Metaverse Generation, Metaverse and Education.

**Suggested Citation:** Tutgun-Ünal, A. & Tarhan, N. (2022). Metaverse Awareness and Generation to Transform Education. *International Journal of Academic Research in Education*, 8(1), 64-74. DOI:10.17985/ijare.1153663

**Article History:** Submitted 03 August 2022; Revised 17 October 2022; Accepted 31 December 2022

### INTRODUCTION

The metaverse has become a new phenomenon these days. Since Facebook's name changed to meta, researchers have published various articles about metaverse. In these studies, it was discussed how the metaverse will contribute to many fields as well medicine, education, marketing, entertainment and et.al. (Hollensen, Kotler & Opresnik, 2022; Hwang & Chien, 2022; Kim, Lee & Choi, 2022; Phakamach, Senarith & Wachirawongpaisarn, 2022; Rospigliosi, 2022; Sun et.al, 2022; Tarhan & Tutgun-Ünal, 2022; Teng et.al, 2022; Johan, 2021).

As in every new technology, cultural differences and various approaches can be observed. So, in the metaverse as well. However, cultural transfers from generation to generation vary with the use of technological tools. It is not possible to keep the value transfer process from generation to generation independent from the development process of communication technologies. The value system is a kind of guide that guides how people will react to situations, events and all life activities, and what behaviors they should behave, and they can differ from person to person (Morsümbül, 2014). For this reason, values and technology are also a part of education.

Every society uses media tools in the context of its own cultural characteristics and gives meaning to it. This, of course, varies according to the structure and characteristics of the society and the suitable media tools are primarily preferred. It is stated that media tools such as social media, digital games, avatars are used to the extent

<sup>1</sup> Corresponding Author: [aylin.tutgununal@uskudar.edu.tr](mailto:aylin.tutgununal@uskudar.edu.tr), ORCID ID: 0000-0003-2430-6322

<sup>2</sup> [nevezat.tarhan@uskudar.edu.tr](mailto:nevezat.tarhan@uskudar.edu.tr), ORCID ID: 0000-0002-6810-7096

that individual satisfaction is obtained. In other words, from the uses and gratifications point of view, it is stated that it is used goal-oriented (Katz, Blumler & Gurevitch, 1974).

The education system is important for a society in the value transfer and culture. Educational pedagogy, as a very serious study, is also affected by technological developments and accordingly, it undergoes transformations from time to time. Before metaverse, it can be said that the attempt to integrate social media into education has also changed education. Social media, which emerged as a Web 2.0 technology, has been included in the education system for various purposes as a supporter of the lessons and providing teacher-student communication outside of the classroom in educational environments. and accordingly the understanding of educational pedagogy has partially changed (Teng et.al, 2022; Tutgun-Ünal, 2022; Tutgun-Ünal & Döğler, 2021).

According to the development of communication technologies, it can be concluded that the education system has also become mosaic due to the unique nature of communication environments. It is stated that generations are divided into three according to the development of communication technologies: (1) Radio Generation, (2) Television Generation, (3) Social Media Generation. Just so, Generation X is called the 'Radio Generation' (45 years old and above), Generation Y is called the 'Television Generation' (30-45 years old), and Generation Z (15-30 years old) is called the 'Social Media Generation' and those under the age of 15 are called the Alpha Generation (Döğler, 2020; Tarhan, 2020).

Generational classification is usually done with the names Baby Boomer, X, Y, Z and Alpha in the sources, regardless of whether they are communication technologies oriented or not (Akdemir et al., 2013; Berkup, 2014; Deniz & Tutgun-Ünal, 2019; Döğler, 2020; Ekşili & Antalyalı, 2017; Tutgun-Ünal & Deniz, 2020; Tutgun-Ünal & Döğler, 2021). Nowadays, we can talk about the metaverse generation with the concept of metaverse.

Technological development, the spread of new media technologies throughout the world and the replacement of communication habits with digital communication were effective in reconsidering generations in the new media era which is the 2000s. While the use of social media, which is the most popular of the new media technologies, spread rapidly in all countries around the world, Facebook changed its name into 'Meta'. Nowadays, as the transition from the social media era to the Metaverse era, generations will also face new communication and behavioral habits in the Metaverse universe and new differences will need to be addressed (Alwin & Mccammon, 2007).

In this respect, it can be said that the concept of generation is not a static but a dynamic concept. With the re-launch of social media under the name Meta, the way of doing business and habits of generations will be transformed with features and effects that will become more widespread, such concepts as Avatar, Space, and Augmented Reality, just like in digital games. These developments foresee that the 'Social Media Generation' will be replaced by the 'Metaverse Generation'. In fact, it would not be wrong to describe the Metaverse generation as the 'Gamer Generation' or 'Gamers' (Tarhan & Tutgun-Ünal, 2022).

Thus, it is important to define the concept of Metaverse and to know its characteristics. In the virtual universe, it is discussed that the Metaverse Generation combines real and virtual life through the mobility of Avatars. It is obvious that this universe will have much more serious disadvantages and dangers for the new generation as well as its advantages (Kye et.al, 2021). In order to take advantage of benefits and avoid the harms, the door of academic studies has been opened for the preventive studies on how the reality of people will be deformed in case of an excessive use of technology.

In the transition from the social media generation to the metaverse generation, it is important to consider the concept of metaverse and how the education system will be transformed in this process, in terms of creating an understandable road map. The transformation of the social media world into a new form integrating with

metaverse will drag people into a digital game, and thus the education system will have to be redesigned and transformed in this gamified environment (Rospigliosi, 2022; Teng, 2022; Tarhan & Tutgun-Ünal, 2022).

As a result, all these studies reveal awareness about the metaverse. Especially in the last 2 years, the publications on the relationship between education and metaverse create a debate about how education will transform in different cultures. It is clear that educators need strong guidance on these issues. Thus, in this study, it was considered important to create awareness by emphasizing the transformation of education with the metaverse.

### **Purpose of the study**

In this study, it is aimed to examine metaverse awareness and generation to transform education. This study was needed because the meaning of the concept was not sufficiently understood by the educators.

## **METHOD**

In the research, descriptive method was preferred and general searching model was used. So, the document analysis technique was found suitable to searching literature. At this point, online databases, thesis library, websites, books were examined and theses, articles, book studies and scientific articles on the websites were discussed. *Document Analysis Technique* refers to the analysis of written materials containing information about the subject under investigation (Yıldırım ve Şimşek, 2008).

When the resources reached were evaluated, many resources were examined by classifying them under the titles of 'Defining the Concept of Metaverse', 'Awareness of Metaverse', 'Metaverse and Education', 'Metaverse Generation and Metaverse's Transformation of Education'. These concepts were also the inclusion criteria in the study. A comprehensive literature synthesis has been put forward by participating in the reports and up-to-date scientific information published on the internet sites.

Accordingly, in line with the examinations made, it was decided to synthesize the sources under the headings of 'Metaverse Concept', 'Metaverse and Education', 'Metaverse Awareness', 'Transformation of Education with the Metaverse Generation'. These titles were used because they overlap with the literature review. Contents not suitable for the titles were the exclusion criteria of the study.

### **1. The Concept of Metaverse**

Although the Metaverse may seem like a stand-alone concept, it can actually be said to be an ecosystem. Metaverse is built on many concepts and means virtual reality and it has become debatable today, since the name of Facebook has changed into "Meta" (Phakamach, Senarith & Wachirawongpaisarn, 2022:76). It should be clearly stated that Metaverse attracted the attention of the digital game market at the first stage, and even it is reported that the places expressed as plots or places in many virtual universes were bought more by the leaders of the digital game world with NFTs.

When investigating conceptually, the concept of Metaverse first appeared in Neal Stephenson's science fiction novel *Snow Crash*, published in 1992. The concept of the Metaverse characterized a fictional world (Grimshaw, 2013). In fact, it was criticized excessively and exaggeratedly when it was put forward. (VentureBeat, 2021). Facebook's interest in the subject has played a big role in its being talked about so much today.

Because Facebook, which has a large data pool in its hands, has metadata of millions of people. This has given rise to the concern that an artificial world based on artificial intelligence will threaten people's individual borders. (Hwang & Chien, 2022; Lee et al., 2021). However, computer-mediated virtual environments, augmented reality applications (i.e., *Pokemon Go*) or non-interventional games, which are also expressed as token games (for

example Upland), have continued to develop and have been effective in facilitating digital transformation. As such, Metaverse is stated to have been invented to further facilitate digital transformation (Lee et al., 2021).

On the other hand, when considered as an ecosystem, futuristic reality catalyzed by technologies within the scope of external developments, 5G and artificial intelligence, the digital cyberspace “Big Bang” does not seem far away. Understanding the ecosystem is very important as we are in the understanding phase in 2022. It is of great importance to understand the concepts correctly, especially in this period when its use in education is started to be discussed. Augmented reality, user interaction (Human-Computer Interaction), artificial intelligence, blockchain, visual objects, robotics, cloud computing and future mobile networks are applications that will allow effective use of the Metaverse ecosystem.

In the Metaverse universe, it is predicted that with technologies such as AR/VR/MR and holograms, it will be possible for people in the physical universe to come together in the virtual universe through their Avatars, and many actions such as visiting each other and doing business together will take place in the Metaverse universe. If this technology is developed enough, people will have the opportunity to do many activities without physical effort such as shopping, going to the movies and spending time in the cafe thanks to virtual reality tools.

When we go back to the concepts; AR (Augmented Reality) consists of physical elements that we perceive in the world around us and computer-generated graphics, video, sound, GPS, etc. It is a type of real-time and interactive experience created as a result of the combination of data. Although AR applications have many examples in different fields, especially since the early 1990s, we can say that it became known all over the world with the release of the PokemonGo application in 2016. The application offers users an interactive and real-time AR experience with graphics, audio and GPS data added to the camera image of the phone (HoloNext, 2020).

On the other hand, VR (Virtual Reality) is actually not a new idea. It is known that the first applications are based on 40-50 years ago. However, its usability has been possible for many reasons after the 2010s with what new technology has to offer (Tiridi, 2021). VR is a way that allows elements such as sounds, sensations, images to replicate the real environment or provide a sense of reality by creating an imaginary world. Everything felt here is a computer-generated three-dimensional world that provides a sense of reality through virtual reality. In virtual reality, 3D environments make people feel reality by making use of other senses such as hearing and movement as well as vision.

MR (Mixed Reality) sometimes called as hybrid reality, is used to produce new environments and visualizations where virtual and real worlds, physical and digital objects coexist and interact in real time (Hwang & Chien, 2022; Lee et al., 2021; Tiridi, 2021). Thus, these new images are placed in a new space and are located in such a way that they can interact to some extent with what is real in the physical world. With MR, synthetic content and real-world content can react to each other in real time.

XR (Extended Reality) is a term recently added to the technical lexicon. It refers to all real and virtual combined environments, human-machine interactions created by computer technology and wearable devices. We can explain it as a term that brings together the three realities described as AR, VR and MR, and another expression under one roof.

The so-called meta-universe can be explained as a permanent, online, 3D world concept that brings together multiple virtual worlds. Meta universe is stated as the future state of the internet in some sources (Binance Academy, 2021). Accordingly, the meta-universe will allow users to work, meet, play, socialize in these 3D worlds. Although not fully implemented, some platforms seem to contain meta-universe-like elements. Thus, cryptocurrencies can be very suitable for a meta-universe. Cryptocurrencies allow the creation of a digital economy with different types of utility tokens and virtual collectibles (NFTs). In addition, blockchain technology is able to offer transparent and reliable governance systems.

When the literature is reviewed, Andrew Bosworth, who runs Facebook Reality Labs, states that “Most of these products will only be fully implemented within the next 10 to 15 years.”. However, we are moving rapidly in a brand-new digital universe where reality and virtual are intertwined when we say Bitcoin, NFT and Metaverse. The issue of purchasing commodity lands has been the focus of many people lately. In fact, we come across the news with the headline “Historical Places are on Sale in Metaverse”.

Today, it is stated that one of the most important Metaverse investors in the world is Facebook, which bought the Oculus Company for 2 billion dollars, which works on virtual reality devices (Bilgile.com, 2022). However, the most investment in Metaverse is made by digital game companies and it is anticipated that they will be quite active in this regard as they are much more familiar.

Discussions about creating a public space in the Metaverse and creating a new world with Avatars, spaces, scenario components and affecting the real world have started. On the one hand, it can be said that after 10 or 15 years (at least) newborns will be born into the Metaverse world and many sociological, psychological and communicative phenomena that we are talking about now such as new habits, behavior, values, culture, communication will be transformed. So much so that the new generation, which can also be called as “Gamers”, will be born in the Metaverse environment and how the culture and value will be transferred to the next generations and how the educational architecture will transform is a matter of curiosity. In this direction, it is thought that the research to be done with sentences starting with web 3.0 will intensify. Just as social media environments, which are now called Web 2.0, new media or new media technology applications have entered the literature; in the coming years, concepts such as Web 3.0, Metaverse, Metaverse generation, Gamers, NFT, Avatars will take their place in research.

## **2. Metaverse and Education**

In the Metaverse worlds, everything that comes to mind is redesigned. Visiting a three-dimensional museum while wearing a VR goggle is not the Metaverse but touching an object in a museum and feeling it can only be the Metaverse. Likewise, entering the classroom setting by wearing glasses again in the Metaverse environment, opening a presentation there, or listening to it will not be Metaverse. Touching, contacting, feeling, sharing emotions can only be Metaverse if they enter the educational environment where communication is also included (Tutgun-Ünal, 2022).

Besides all these, the educational content is not ready yet. In this direction, it is seen that there is a need for educational content. Although, due to COVID-19, non-face-to-face online lectures are being held all over the world and in higher education in the post-corona era, distance learning has become the main teaching and learning method (Kim, Lee & Choi, 2022).

According to Kim, Lee & Choi (2022), metaverse has basic elements such as avatars, 3D space, and activities accompanied by interaction, which can be seen as a difference compared to existing VR (Virtual Reality) contents. But interaction requires technologies such as haptic clothing (i.g. haptic gloves). There is also a need for a new pedagogical perspective for educational content.

On the other hand, the effect of gamification in education is undeniable. In recent years, education curricula have started to change with gamification in many private campuses. Maybe 10 years later, all of the education that does not require many physical contacts will be in the metaverse environment, and thus educational institutions, universities, large campus areas, and large buildings will not be needed.

It is stated that with metaverse, much more efficient learning-teaching environments can be realized for students in education, and the chance to experience simulations and contents will arise. This generation, who are already digital citizens from the moment they are born, will easily find a place for themselves in the Metaverse and will

constantly improve their experiences. However, it is stated that we will need to work on Metaverse Awareness and *Metaverse Instructional Designs* in order for these students to reach quality and truly productive education here (Kim, Lee & Choi, 2022; Tarhan & Tutgun-Ünal, 2022; Teng et.al, 2022; Tutgun-Ünal, 2022).

Pedagogical structure is very important for designing metaverse platforms in education. Pedagogy, as the basic unit of the learning-teaching process and child education, started in Ancient Greece and is based on the objectives that the student should have, the knowledge clusters (content) that bring these goals, the methods and techniques for the acquisition of the content, measurement and evaluation.

From Ancient Greece to the present, pedagogy refers to the education of the 22nd century with the Metaverse. Lessons will no longer be held in physical environments, but in Metaverse environments. Since the learning-teaching processes are not under the supervision of teachers in schools and will also be realized with techno-digital equipment, a very new education ecosystem will be formed.

On the other hand, in metaverse training, it is stated that many components and factors must change significantly, and it is emphasized that new areas of expertise will also be needed. Some of them are listed as follows: Metaverse Instructional Design, Metaverse Pedagogy, Metaverse Design, Avatar Design, Metaverse Artificial Intelligence Applications, Metaverse Sociology (Tutgun-Ünal, 2022).

Metaverse refers to the transformation as it requires beyond what is now. An education system that is expected to transform itself, from technical infrastructure to educational content providers, will only enable Web 3.0 and the Metaverse universe. Thus, for Metaverse and educational transformation, the concepts of understanding, narration and application, which are mentioned as the initial stage, must be understood very well. For this, awareness should be provided to all educators from seven to seventy. That is, all generations within the education ecosystem should be aware of the metaverse.

In fact, it is seen that scientific studies on the relationship between metaverse and education have increased especially in the last two years (Hwang & Chien, 2022; Kim, Lee & Choi, 2022; Kye et.al, 2021; Phakamach, Senarith & Wachirawongpaisarn, 2022; Rospigliosi, 2022; Tarhan & Tutgun-Ünal, 2022; Teng et.al, 2022; Tutgun-Ünal, 2022; Yohan, 2021). And even some of these studies describe experiences of teaching from the metaverse platform to the students. One of the studies on the use of metaverse in education was implemented in South Korea during the post-pandemic period (Kim, Lee & Choi, 2022).

This study designed and built an educational metaverse platform that can be applied to actual lectures by reflecting the three elements of the metaverse (avatars, 3D space, interaction). Usability tests were conducted with middle school, high school, university students and parents so that everyone can easily participate in Metaverse classes. Just as services such as the existing video conferencing solution Zoom are used for non-face-to-face training, some functions of the metaverse used in the study are used for training, but are used as a one-time event. Thus, it was concluded that this system should be developed in future studies (Kim, Lee & Choi, 2022).

As can be seen, although there are attempts to use metaverse in education, it will take a few years for it to reach a sufficient level. Nevertheless, these studies are very important for metaverse awareness.

### **3. Metaverse Awareness**

With the emergence of the Metaverse concept, issues such as buying land with NFT were discussed and the concept was emptied in the Turkish environment. Therefore, it is necessary to understand the initial stages well in order to express that there is a very important phenomenon in the future world with a very different feature and dimension. So, metaverse awareness is the first step to understanding the metaverse.

To explain what the concept of Metaverse is, it is a universe where people can enter, interact, shop with an interface, express themselves and train (BBB Türk, 2022). Metaverse applications are a topic that has been discussed in Hollywood movies for a long time. Though it is not very new; it started to be discussed suddenly after the Facebook application changed its name to “Meta”. It started when Mark Zuckerberg said he was going to hire ten thousand engineers and allocated a budget of ten thousand billion dollars.

To put it simply, in the Metaverse environment, we will go to the market and make the payment with cryptocurrencies, just like we take the grocery cart and walk around when we enter a real market. There are various valued coins called NFTs. There are industries that produce wearables, and there are also portable industries. With wearable technologies (i.g, haptic gloves) there will be a sense of touch. It is very important to understand what is metaverse in order to explain the concept of the Metaverse. Educators have a lot to do at this point.

It can be used in a very important way in education of laborious and costly jobs like language education, medical education, working on cadavers. Physics education is very important in history education. A universe is formed where we can enter that structure with a small lens. In the metaphor research conducted with 165 people, what is understood when Metaverse is mentioned, namely the perception of Metaverse was investigated. According to this, it was seen that 70 metaphors were produced such as a dream (11%), parallel universe (11.5%), virtual universe (10.3%), fantasy world (7.9%), new internet (5.4%), and utopia (3.6%) (Tutgun-Ünal, 2022).

Thus, it can be said that the education system will transform with the correct understanding of the concept of metaverse. As Web 3.0 technologies, in order to for education to be possible in the metaverse universe; understanding, explaining and applying must now be added under the new educational pedagogy. Thus, discussions such as what will happen next and what will be transformed can be built on this.

#### **4. Transformation of Education with the Metaverse Generation**

As an application of Web 2.0 technologies, the use of social media in education coincides with the social media generation period. With the Facebook’s name turning into “Meta”, the Metaverse discussions have brought a new virtual universe to the agenda, but it is expected that it will take at least 10-15 years so that it can become functional. For this, firstly, technological infrastructure must be ready for a decentralized system.

From an educational point of view, the social media generation now will be those who build the Metaverse virtual world, and those born maybe 15 years from now will be born into the Metaverse world. Therefore, we will call future generations as “the Metaverse Generation” or “the Gamer Generation” (Tarhan & Tutgun-Ünal, 2022). All infrastructure works should be ready, metaverse pedagogy and metaverse teaching architecture should be reconsidered and designed. It can be said that all needs will now be expressed as transformation, unlike Web 2.0.

Let's take an example from social media, which is the most common application of web 2.0 technologies. One of the most attractive features of social media is entertainment. The use of social media by young users, especially in meeting their needs for entertainment, maintaining friendships, relaxation, social activities, communication and interaction, is the motivation for use that has been revealed in accordance with various research (Canöz, 2016; Karal & Kokoç, 2010). Because social media applications respond to you in whatever way you look at it.

Unlike web 2.0, in web 3.0, the metaverse generation will enter the metaverse with their Avatars and participate in the education-teaching process by touching and living in a gamified environment (Contreras, Ceba & Escobar, 2022; Kye et.al, 2021). This generation, which will also be called the gamer generation, will only be able to talk about the Metaverse transformation in the future, when they experience the feeling of touch realistically with wearable haptic clothes (e.g., gloves, clothes).

The design of huge educational contents according to the new generation metaverse teaching architecture, the technical infrastructure and the serving of these contents in the metaverse universe require a new generation pedagogical formation, which will be called metaverse pedagogy, and it is foreseen that education will transform only in this way (Tutgun-Ünal, 2022).

## CONCLUSION

In today's social media age, research findings that show that educational activities increase the motivation of students when they are carried out in social media environments draw attention. In this direction, the subject of teaching in the social media or providing the communication of the lesson, experienced by many instructors, has attracted attention in terms of accessing the educational activities of the younger generations from the environment they have fun.

We are entering a period in which many digital game components such as space design, Avatars and scenarios are being built for the Metaverse universe, together with Facebook, which has taken the name "Meta". In this sense, Metaverse offers a gamified universe. When the necessary infrastructure is provided in the future, those born into the Metaverse world will be called the Metaverse Generation or Gamer Generation and will experience this virtual world.

Thus, it is expected that the education of the Metaverse generation will become completely different with clothes that will provide the feeling of touch in the virtual Metaverse world in an educational environment without huge campuses and buildings. Therefore, it is also important to understand the subject correctly in these days, which is preparing the ground for transformation in education. New Metaverse instructional design models will only be possible with the right metaverse awareness.

Since the global technology usage culture varies, each country will have reflections of its own cultural understanding in the relationship between metaverse and education. The first examples of metaverse's use in education, as seen in research, are seen especially in technology-oriented countries such as South Korea (Kim, Lee & Choi, 2022; Suh & Ahn, 2022). Regarding the use of Metaverse as an education platform, it is stated that it is not yet at the expected level in terms of technology and educational content production (Kye et.al, 2021).

On the other hand, one dimension of research is perception determination studies. In other words, whether the concept of metaverse is understood correctly by educators is determined by descriptive studies such as metaphor analysis or evaluation of educational experiences in the metaverse (Lopez-Belmonte et. al, 2022; Teng et. al, 2022; Tutgun-Ünal, 2022). These studies provide important data for metaverse awareness. It is also an opportunity to clear up potential misunderstandings.

Especially in the last two years, the number of articles on the study of the metaverse, the relationship between the metaverse and education, and the applications of the metaverse has increased considerably. In this study, it is aimed to draw attention to these issues and the concept of metaverse generation has been put forward. Thus, new concepts as well metaverse generation, metaverse pedagogy have been proposed for future studies to be done. As a result, it was concluded in the study that the metaverse is not defined correctly, the content is not yet sufficient for the metaverse education, and the metaverse pedagogy for content production is not ready yet.

## References

- Akdemir, A., Konakay, G., Demirkaya, H., Noyan, A., Demir, B., Ağ, C., Pehlivan, Ç., Özdemir, E., Akduman, G., Eregez, H., Öztürk, İ., & Balcı, O. (2013). The investigation of relationship between organizational an investigation of expectations of career perception and change, and leadership style of generation Y. *Journal of Economics and Management Research*, 2(2), 11–42.
- Alwin, D.F. & Mccammon, R.J. (2007). Rethinking generations. *Research in Human Development*. 4(3-4), 219–370.
- BBN Türk (2022). Metaverse Nedir? [What is Metaverse?]. <https://www.youtube.com/watch?v=YMT7tYgQt5Q>
- Berkup, S. B. (2014). Working with generations X and Y in generation Z period: Management of different generations in business life. *Mediterranean Journal of Social Sciences*, 5(19), 218–229.
- Bilgile.com (2022). *Metaverse Nedir?* [What is Metaverse?]. <https://www.bilgile.com/teknoloji/488-Metaverse-nedir.html>
- Canöz, N. (2016). İletişim fakültesi öğrencilerinin kullanımlar ve doyumlar yaklaşımı çerçevesinde sosyal medya kullanım alışkanlıkları [Social media uses and gratifications approaches on faculty of communication students' social media habits]. *SUTAD*, (39), 423–441.
- Contreras, G.S., Cepa, C.B.M., & Escobar, J.C.Z. (2022). The importance of the application of the metaverse in education. *Modern Applied Science*, 16(3), 34–40. <http://dx.doi.org/10.5539/mas.v16n3p34>
- Deniz, L. & Tutgun Ünal, A. (2019). Sosyal medya çağında kuşakların sosyal medya kullanımı ve değerlerine yönelik bir dizi ölçek geliştirme çalışması [Development of a set of scales toward the use of social media and values of generations in social media age]. *OPUS–Journal of Society Research*, 11(18), 1025–1057. <http://dx.doi.org/10.26466/opus.557240>
- Döğner, Ç. (2020). Y Kuşağının sosyal medya kullanım seviyeleri ile farklılıkları kabul değerleri üzerine bir araştırma [A research on the social media usage levels of generation Y and the differences of the acceptance values. *Master Thesis*, Uskudar University, Institute of Social Science, Istanbul, Turkey.
- Ekşili, N. & Antalyalı, Ö.L. (2017). Türkiye’de Y kuşağı özelliklerini belirlemeye yönelik bir çalışma: Okul yöneticileri üzerine bir araştırma [A study to determine the characteristics of generation Y in Turkey: A survey on school administrators]. *Humanities Sciences (NWSAHS)*, 12(3), 90–111. <http://dx.doi.org/10.12739/NWSA.2017.12.3.4C0219>
- Grimshaw, M. (2013). *The Oxford handbook of virtuality*. New York.
- Hollensen, S., Kotler, P., & Opresnik, M.O. (2022). Metaverse – the new marketing universe. *Journal of Business Strategy*, 2022. <https://doi.org/10.1108/JBS-01-2022-0014>
- HoloNext (2020). *Artırılmış Gerçeklik AR (Augmented Reality) Nedir?* [What is Augmented Reality?] <https://holonext.com/tr/artirilmis-gerceklik-nedir-ar/>
- Hwang, G.J. & Chien, S.Y. (2022). Definition, roles, and potential research issues of the metaverse in education: An artificial intelligence perspective. *Computers and Education: Artificial Intelligence*, 3(2022), 100082. <https://doi.org/10.1016/j.caeai.2022.100082>
- Karal, H., & Kokoç, M. (2010). Üniversite öğrencilerinin sosyal ağ siteleri kullanım amaçlarını belirlemeye yönelik bir ölçek geliştirme çalışması [University students' aims of use of social network sites scale: Development and validation]. *Turkish Journal of Computer and Mathematics Education*, 1(3), 251–263.
- Katz, E., Blumler, J. G., & Gurevitch, M. (1974). Uses and Gratifications Research. *The Public Opinion Quarterly*, 37/4:509-523 (Winter, 1973-1974).

- Kim, J.H., Lee, B.S., & Choi, S.J. (2022). A study on metaverse construction and use cases for non-face-to-face education. *The Journal of the Convergence on Culture Technology (JCCT)*, 8(1), 483–497. <http://dx.doi.org/10.17703/JCCT.2022.8.1.483>
- 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(32), 1–13. <https://doi.org/10.3352/jeehp.2021.18.32>
- Lee, L., Braud, T., Zhou P., Wang, L., Xu, D., Lin, Z., Kumar, A., Bermejo, C., & Hui, P. (2021). All one needs to know about metaverse: A complete survey on technological singularity, virtual ecosystem, and research agenda. *Computers and Society*, 14(8), 1–66. <https://arxiv.org/pdf/2110.05352.pdf>
- Lopez-Belmonte, J., Pozo-S anchez, S., Lampropoulos, G., & Moreno-Guerrero, A. (2022). Design and validation of a questionnaire for the evaluation of educational experiences in the metaverse in Spanish students (METAEDU). *Heliyon*, 8, e11364. <https://doi.org/10.1016/j.heliyon.2022.e11364>
- Morsümbül, Ş. (2014). Kültürel değerlerin üç kuşak arasındaki değişimi üzerine bir inceleme: Ankara örneği [A study on the cultural value change across three generations: Ankara sample]. *University Journal of Turkish Studies/HÜTAD*, 21, 137–160.
- Parsons, K.M.a.D. (2019). Teacher perspectives on mobile augmented reality: The potential of metaverse for learning. In *Proceedings of World Conference on Mobile and Contextual Learning 2019* (pp. 21-28). Retrieved December 30, 2022 from <https://www.learntechlib.org/p/210597/>.
- Phakamach, P., Senarith, P., & Wachirawongpaisarn, S. (2022). The Metaverse in Education: The Future of Immersive Teaching & Learning. *RICE Journal of Creative Entrepreneurship and Management*, 3(2), 75–88. <http://dx.doi.org/10.14456/rjcm.2022.12>
- Rospigliosi, P.A. (2022) Metaverse or Simulacra? Roblox, Minecraft, Meta and the turn to virtual reality for education, socialisation and work. *Interactive Learning Environments*, 30(1), 1–3. <https://doi.org/10.1080/10494820.2022.2022899>
- Suh, W. & Ahn, S. (2022). Utilizing the metaverse for learner-centered constructivist education in the post-pandemic era: An analysis of elementary school students. *Journal of Intelligence*, 10(17). <https://doi.org/10.3390/jintelligence10010017>
- Sun, M., Xie, L., Liu, Y. Li, K. Jiang, B., Lu, Y., Yang, Y., Yu, H., Song, Y., Bai, C., & Yang, D. (2022). The metaverse in current digital medicine. *Clinical eHealth*, 5, 52–57. <https://doi.org/10.1016/j.ceh.2022.07.002>
- Tarhan (2020). *Z kuşağı kayıp kuşak olmasın [Generation Z should not be the lost generation]*. <https://uskudar.edu.tr/tr/icerik/5466/prof-dr-nevzat-tarhan-z-kusagi-kayip-kusak-olmasin>
- Tarhan, N. & Tutgun-Ünal, A. (2022). *Metaverse: Dijital Oyun Psikolojisi [Metaverse: Digital Game Psychology]*. Istanbul, Turkey: Der Publishing.
- Teng, Z., Cai, Y., Gao, Y., Zhang, X., & Li, X. (2022). Factors affecting learners’ adoption of an educational metaverse platform: An empirical study based on an extended UTAUT model. *Hindawi: Mobile Information Systems*, 2022, 5479215, 1-15. <https://doi.org/10.1155/2022/5479215>
- Tutgun-Ünal, A. (2022). Metaverse metaphors according to the content analysis method. *Social Research-Scientific-analytical journal*, 2(1), 52–67.
- Tutgun-Ünal, A. & Deniz, L. (2020). Sosyal medya kuşaklarının sosyal medya kullanım seviyeleri ve tercihleri [Social Media Usage Levels and Preferences of Social Media Generations]. *OPUS- Journal of Society Research*, 15(22), 125–144 <https://doi.org/10.26466/opus.626283>

- Tutgun-Ünal, A. & Döğer, Ç. (2021). *Kuşakların iletişimi ve farklılıkları [Communication and differences of generations]* in (Ed. İşman, A., Özgür, A. Z., Adıgüzel, Y., Öztunç, M.) *İletişim Çalışmaları 2021 [Communication studies 2021]*. E-Book, Turkey: Eğitim Publishing.
- VentureBeat (2021). *Facebook's vision of the metaverse has a critical flaw*. <https://web.archive.org/web/20210912132221/https://venturebeat.com/2021/09/12/facebooks-vision-of-the-metaverse-has-a-critical-flaw/>
- Yıldırım, A. & Şimşek, H. (2008). *Sosyal Bilimlerde Nitel Araştırma Yöntemleri [Qualitative research methods in the social sciences] (6th Edition)*. Ankara, Turkey: Seçkin Publishing.
- Yohan, H. (2021). Invitation to metaverse: A discussion on the need of a new space for future education. *The Journal of Studies in Language*, 37(3), 377–389. <https://doi.org/10.18627/jslg.37.3.202111.377>