INTERNATIONAL JOURNAL OF MODERN EDUCATION STUDIES

| Volume 9 - No 2 - December 2025 - ISSN 2618-6209 |

Research

21st Century Skills and Language Education: Metaverse Technologies and Turkish Education as a Case

Elif Ermağan[1]

Article Type
Original Research

International Journal of Modern Education Studies
2025
Volume 9, No 2
Pages: 414-433
http://www.ijonmes.net

Article Info:

Received 16.03.2025
Revision 13.07.2025
Accepted 28.07.2025

Abstract:

As the forthcoming iteration of the Internet, the metaverse is positioned to transform the technological landscape on a global scale. This study explores why and how the metaverse language education model is growing globally. In this research, a qualitative approach is used for the document review method. The theoretical framework draws from world literature, mainly English works, and in the analysis part from the studies of Turkish academics. The study underlines that the field of language education has made notable developments, particularly in the context of technological advancement. The metaverse language education model could bring some effective solutions for distance education, personalized learning, and for visual, engaging, and active learning that does not rely on memorization. This study reveals the indisputable impact of 21st-century innovative technologies on language education, along with the associated risks. It further postulates that more efficacious language education may be attainable in the future by addressing the identified shortcomings. The experience of language education in the metaverse of the Turkish language, which is currently experiencing a period of growth the number of people learning it, can also provide an opportunity for comparison with other languages and related literature from around the world.

Keywords: Education, Language Education, 21st Century Skills, Metaverse Technologies, Türkiye

Citation:
Ermağan, E. (2025). 21st Century Skills and Language Education: Metaverse Technologies and Turkish Education as a Case. *International Journal of Modern Education Studies, 9*(2), 414-433. https://doi.org/10.51383/ijonmes.2025.411

[1] Dr., Istanbul Medeniyet University, IMU TOMER, Istanbul, Türkiye. elifermagan2020@gmail.com, https://orcid.org/0000-0002-2827-0155

INTRODUCTION

The primary objective of language studies is to enhance efficiency by addressing the various challenges inherent to educational processes. To facilitate the acquisition of a language in a more expeditious, enjoyable, and enduring manner, a variety of tools are required. The digital revolution, which has impacted various sectors through the advent of new technologies in the Industry 4.0 era of the 21st century, has also brought about significant shifts in language teaching globally (Aldossari & Alsuhaibani, 2021, pp. 1-8). Despite the continued importance of books as a language teaching tool, there is a growing recognition of the value of interactive virtual content. The Fourth Industrial Revolution has brought about profound changes in the field of education, with the advent of new technologies such as artificial intelligence, machine learning, the Internet of Things, cloud computing, 3D printers, speech recognition systems, and virtual world technologies (Ağaoğlu & Demir, 2020). The term "virtual world technologies" encompasses a range of innovative concepts, including virtual reality (VR), augmented reality (AR), mixed reality (MR), the metaverse, holograms, wearable technologies, and smart personal assistants (Büyükkarabacak & Balyer, 2024). These technologies represent an artificial projection of reality (Díaz et al., 2020, pp. 94-109; Reisoğlu et al., 2017). This study will investigate the impact of metaverse technology, which seeks to bridge the divide between the physical and virtual realms, offering users unprecedented freedom in space and time through the construction of an alternative reality, on language teaching, with a particular focus on its application within the context of Turkish education, thereby contributing original insights to the field (Yıldırım & Keçeci 2024). Determining the current status of metaverse language education technologies in Turkey and the extent to which these applications have transformed language education will not only measure their benefits to education in the country but also test their institutionalization within the global and European spheres.

The metaverse is an environment created by a computer (Ng, 2022). The metaverse, which has become increasingly significant, particularly in light of the proliferation of distance education, offers users the chance to engage with experiences in a virtual domain that they may otherwise be unable or unwilling to pursue in the physical world (Guo & Gao, 2022). One illustrative example of the potential impact of the metaverse on language education is the capacity for students to engage in real-time interaction with educators and peers from diverse geographical locations. It is possible to envisage delivering language education not only through textbooks but also through interactive environments such as the metaverse (MacCallum & Parsons, 2019).

The incorporation of visual elements, repetition, sampling, and vocalization technologies enhances the field of language education in e-learning. Furthermore, the utilization of virtual or video techniques in conjunction with artificial intelligence technologies has the potential to facilitate transformative impacts on learners (Ural, 2021, pp. 145-161; Bostancı & Uncu, 2021, pp. 154-169). Concurrently, the relationship between

virtual reality and language education has been a subject of investigation in the academic literature worldwide, particularly over the past decade. However, the majority of studies in this field are theoretical in nature. In other words, although virtual reality applications have attracted considerable attention, they remain a relatively niche phenomenon in Turkey, as in the wider global context (Alyaz & Demiryay, 2023, p. 116).

The pivotal role of the metaverse in language education is exemplified by the work of Garrido-Iñigo and Rodríguez-Moreno (2015), who created a virtual airport for teaching French as a second language to tourism students. Their observations indicated that student engagement in activities enhanced motivation. In their study with 104 teachers, Han and Hong (2022) found that the metaverse was perceived positively in terms of effectiveness, interest, and engagement. However, they also drew attention to the issue of distractions and limited teacher experience. This emphasizes the significance of teachers' expertise and experience in language education within the context of the metaverse. In a study conducted with Japanese language learners, Tamai et al. (2022) devised activities within the Second Life gaming environment, wherein traditional Japanese architectural and cultural elements were incorporated, including virtual representations of Shinto and Buddhist temples. By establishing a collaborative learning environment between native Japanese speakers and Japanese learners, they facilitated the transmission of Japanese traditions and provided international students with the opportunity to experience these virtual temples. Kim et al. (2022) devised communication-oriented scenarios within the metaverse for Korean language classes and developed bespoke teaching models for each scenario. In conclusion, there is an increasing body of research on the topic of language education in the metaverse, with studies being conducted in a variety of countries (Şimşek et al., 2019).

The primary argument put forth by the study is that despite the inherent risks associated with Metaverse education methodologies, there will be unquestionable losses if they are not incorporated into the learning landscape of our era. It is therefore recommended that, when teaching both mother tongue and foreign languages, learning methods and environments that will enhance learner motivation or facilitate communication across different geographical locations be employed. This article will initially present an explanation of the theoretical and conceptual studies on the metaverse and language education on a global scale. It will then focus on similar studies conducted in Turkey as part of field research. In conclusion, a comprehensive evaluation and recommendations for metaverse language education will be presented.

METHOD

This research employs a methodology based on document analysis using secondary sources. Document analysis is the collection, review, questioning, and analysis of various forms of written text as a source of primary research data (O'Leary, 2017). This method

includes the processes of finding, reading, taking notes, and evaluating sources for a specific purpose, and data is obtained by examining existing records and documents.

This article focuses on 21st century skills in language learning. In this context, Metaverse technologies have been selected, and the effects and contributions of these technologies to language learning activities have been investigated. In this sense, the Turkish language will be examined as an example.

The basic question is how new technologies affect language learning. Various countries are conducting studies in this context in the relevant literature. For new technological language learning, both the number of academic studies and the technological infrastructure of that country should be adequate and developed. The critical point here is that the technological infrastructure should be solid. Otherwise, the academic studies conducted will remain unutilized in the literature. The other point is that literature research should be conducted with a comparative perspective.

The majority of relevant literature, books, articles, and web publications were consulted in English, with a smaller number also consulted in German and Turkish. Internet bibliographies and media publications, which report on new infrastructure works, were also included among Turkish sources.

A theoretical and conceptual data set was created based on the studies conducted in different parts of the world. Conversely, this research is less prevalent within the social sciences (Tlili et al., 2022). Nevertheless, the aforementioned educational model requires further development in the social sciences (Öner, 2022; Cheng et al., 2017).

Recent research indicates that metaverse research within the field of education is predominantly undertaken in the USA, Brazil, Japan, Spain, and South Korea. Furthermore, a comparison of the shortcomings and opportunities of metaverse language education was finalized with a specific perspective. At this point, the Turkish case will contribute to the expansion of the existing literature on this topic.

As developments in Turkey are still in their infancy, the examples and developments presented are primarily drawn from news sources and institutional websites. Gün and Delen examine the metaverse application as an exemplar of digitally-based material design in the context of teaching Turkish as a foreign language (Gün & Delen, 2022, pp. 4467-4486). The article by Uzdu Yıldız and Bilgisu, entitled "How can Metaverse Tools be Used in Teaching Turkish as a Foreign Language to Children?" is more conceptual (Uzdu Yıldız & Bilgisu, 2023). In Bıçak's master's thesis, the views of teachers and students were examined in the context of designing ideal environments for language learning in the metaverse. The subjects comprised 20 students studying in secondary schools in Malatya in the 2022-2023 academic year, and 19 English teachers working in secondary schools. The present study focuses on the field of metaverse studies in the context of Turkish education, with the aim of providing a comparative perspective for similar studies in a global context.

When evaluated overall, it is thought that researching this innovative, technology-supported education and language teaching tool around the world will contribute to the relevant literature. The Turkish example could also make various contributions in that context.

Ethical considerations

This research was conducted using the document analysis method, which involves the systematic review and interpretation of existing documents. Since the study did not include human participants or the collection of personal data, ethical concerns such as informed consent or confidentiality were not applicable.

All analyzed documents were publicly available or obtained from open-access sources. The researcher ensured that all materials were cited appropriately and that the integrity of the original sources was preserved.

The study was carried out in compliance with the "Higher Education Institutions Scientific Research and Publication Ethics Directive." No violations of ethical principles—such as plagiarism, falsification, or misrepresentation—occurred during the research proces

FINDINGS AND DISCUSSION

In this section, a theoretical framework will be developed for the current study based on theories in the world literature on education and language education. In this field study, the infrastructure works in Turkey, will be explained, and in the context of Metaverse-Turkish education, opportunities and developments will be determined. Finally, the Turkish example will be discussed according to theoretical frameworks.

Conceptual and Theoretical Framework: Metaverse, Education and Language Education

The metaverse has considerable potential in a number of areas, including education, business meetings (Durana et al., 2022), volunteer-entertainment-centred sporting, artistic, and cultural activities in virtual environments (Bayram, 2022: 1-7), and medical examination environments (Schweitzer & Rizzo, 2022). The potential of the metaverse in the field of education is particularly evident in its capacity to simulate concrete experiences in a range of disciplines, including geography, medicine, and visual arts. To illustrate, in geography classes, students can undertake virtual visits to diverse countries and regions, which can enhance the appeal of the subject matter and make learning more engaging.

Similarly, in the field of medical education, virtual internships or surgical simulations can facilitate students' acquisition of practical knowledge, enabling them to gain experience in a realistic setting. The impact of the metaverse on education is transformative, affecting numerous areas, including language learning and the overall learning experience. The metaverse is particularly well-suited to Generation Z, who are accustomed to rapid change

as evidenced by research (Park & Kim, 2022). Indeed, 67% of Roblox, which offers a virtual gaming experience and has 43.2 million daily active users, users are under the age of 16, while only 14% of the platform users are over the age of 25 (Dean, 2022). It is evident that e-learning and the metaverse can play a pivotal role in this framework.

Sutopo's book discusses how the metaverse could provide immersive and engaging learning experiences, personalized training, and access to education for anyone with an internet connection (Sutopo, 2023). The metaverse education model (Dwivedi et al., 2022) is notable for a number of distinctive functional outcomes, the first of which is interaction. The metaverse enables individuals to engage in virtual interactions with avatars generated within virtual environments. Consequently, individuals can virtually observe, practice, and discuss physical experiences with a diverse range of others. The integration of senses such as taste, touch, and smell, which are currently being developed in the virtual world, into the relevant system would significantly enhance the experience and learning that takes place within the metaverse, elevating it to a new level of engagement and understanding. 2) Decentralisation and Compatibility: The advantages will be optimized when different platforms and applications are compatible with one another. 3) Persistence, Accessibility, and Concurrency: The metaverse is designed to be independent of both temporal and spatial constraints. Consequently, a global community will be created in which individuals from all over the world can participate. Consequently, activities pertaining to culture, art, education, psychology, business, and the economy can be conducted virtually rather than physically anytime. Accordingly, the metaverse comprises numerous technological components such as augmented reality, virtual reality, extended reality, mixed reality, web 3.0 technology, blockchain technology, and artificial intelligence (Çilek, 2023, p. 81).

The following methods are particularly efficacious in the context of the metaverse when teaching languages: These methods include virtual interactive lessons, game-based learning, virtual reality tours, foreign language teaching applications, and virtual language buddies. These are based on an approach that emphasizes problem-solving, task-based learning, and scenario-based activities. In a metaverse educational environment, the most crucial element is the sense of social presence, which is essential for learners to feel connected with their peers. In this regard, it is important that the interaction is three-dimensional (Cruz-Lara et al., 2010).

The virtual platform created by the Metaverse provides students with the opportunity to interact with other users through social chat and to communicate effectively through environmental objects, gestures, poses, facial expressions, and explicit or implicit references. This demonstrates the importance of communicating both verbal and non-verbal expressions to students. Furthermore, research indicates that the metaverse is aligned with contemporary educational methodologies, including virtual learning, collaborative learning, game-based learning, and problem-based learning (Das et al., 2024). The metaverse provides students with an active and global learning experience.

The metaverse represents a technology that allows users to be in multiple locations and time zones simultaneously (Duan et al., 2021). This offers significant benefits in distance education by eliminating the necessity for students to be physically present in a specific location (Mystakidis, 2022). To illustrate, a student in Bolivia who aspires to acquire Chinese language proficiency may have the opportunity to do so through engagement with a virtual Chinese language environment within the metaverse digital realm. Virtual environments can facilitate language acquisition by enabling the formation of rich social interactions and the undertaking of problem-solving activities, which are essential for effective social constructivist learning. Furthermore, they provide students with novel avenues for acquiring a foreign language and engaging in cross-linguistic communication. For educators, platforms such as the metaverse present novel avenues for facilitating learning. Consequently, educators are able to facilitate and encourage students' social interactions and learning processes. It is crucial for educators to adapt to this novel environment and utilize it effectively (Kye et al., 2021, p. 1).

The metaverse provides a developable feature that can be used to address and overcome the challenges inherent to the learning process for students. Using interactive learning tools, such as task-based games, enables students to assimilate the course material more effectively. Furthermore, it enables students to enhance their linguistic abilities.

Conversely, the metaverse may present certain difficulties with regard to language learning. However, these challenges can be mitigated through the implementation of efficacious solutions. Technical issues, such as those pertaining to internet connectivity and the lack of a user-friendly interface, can be resolved. Furthermore, the incorporation of interactive elements has the potential to enhance engagement and motivation. It is anticipated that the use of metaverse language learning will become more prevalent.

In their analysis of the metaverse model of education, Hirsh-Pasek et al. identify a pivotal aspect that warrants further examination. The potential of augmented reality, virtual reality, and 3D technology to transport children into new environments that they may never be able to explore or visit represents a significant opportunity for educational advancement. In terms of critical thinking skills, students have the opportunity to solve real-world problems and showcase their products not only at their school, but also to a broader community. With regard to enduring questions pertaining to Greek culture, learners may choose to explore different historical periods or even gain first-hand experience in scientific laboratories, thereby facilitating a meaningful integration of theoretical knowledge with practical applications (Hirsh-Pasek et al., 2022, p. 10).

The advent of the metaverse, a technological revolution, offers students the opportunity to engage in game- and scenario-based learning experiences, particularly in the domain of language education. This innovative approach can facilitate the development of diverse language skills. Students may engage in the practice of new languages within simulated environments through real-time conversational interactions with virtual

characters or their fellow students. Technologies such as virtual reality and augmented reality provide realistic scenarios for the practical utilization of language. This approach to language learning is more engaging and facilitates greater fluency. The utilization of the metaverse for language learning offers a multitude of advantages. Students can enhance their capacity for critical thinking and problem-solving by engaging in cognitive processes within the target language. Additionally, the platform fosters collaborative learning through interactions with other students or native speakers. Moreover, this system enables students to express themselves more freely through their virtual avatars, thereby facilitating a language education that is free from concerns about communication or making mistakes. Despite the advantages of the metaverse in the field of education, issues such as the cost of the platforms and hardware, as well as limitations in access for students, have yet to be addressed (Uzdu Yıldız & Bilgisu, 2023, p. 284).

The metaverse encompasses virtual reality, which is currently the most prevalent and effective technology in the field of education. The use of virtual reality encourages the more widespread incorporation of three-dimensional environments in educational settings, wherein emotional engagement is heightened, and students are afforded a more nuanced and immersive learning experience. This can assist in the mitigation of issues such as boredom and distraction, particularly within the context of asynchronous learning environments. The utilization of conventional 2D online educational instruments provides students a constrained perception of self and engagement. Nevertheless, the potential for interaction and emotional expression is greater in 3D environments within the metaverse. Consequently, the utilization of metaverse platforms facilitates enhanced learning and interaction among students. When the metaverse is evaluated in terms of its impact on the field of education, it emerges as a promising avenue for addressing the challenges inherent to online learning. Using virtual reality and three-dimensional environments has the potential to enhance the efficacy of the educational process, offering students a more immersive and engaging learning experience. It has the potential to enhance the learning experience by offering an environment in which students and educators can engage with experiences that are not feasible in the physical world. Moreover, the diversification and personalization of learning materials can facilitate a more effective adaptation to students' diverse learning styles and rates of acquisition.

Ultimately, using the metaverse in an educational context has the potential to alter the learning experience significantly. Nevertheless, meticulous planning, training, and pedagogical methodologies must be devised to actualize this potential fully.

Metaverse in Turkey and Turkish Education

Metaverse Works in Turkey

Despite the current lack of sufficient infrastructure and educational initiatives pertaining to the metaverse in Turkey, there is a discernible increase in interest (Turan et al., 2022; Üçgül et al., 2022; Hürriyet Daily News, 2021). In recent years, Turkey has been

identified as a leading nation in Google search results for the metaverse. Both private and public institutions in Turkey are engaged in monitoring the advancement of this technology. Turkey's inaugural metaverse-oriented pre-incubation facility designated the "Metaverse Venture Studio" was inaugurated at Süleyman Demirel University. The university boasts facilities for avatar creation, virtual reality, non-fungible tokens (NFTs), and environmentallyconscious studios. Virtual visits to Atatürk's NFT studio, the first of its kind in Turkey, are available (Süleyman Demirel University, 2023). Furthermore, a workshop on "Metaverse Mixed Reality" was initiated within the Ministry of Education (MoE) in Gaziantep. The objective is to facilitate students' access to historical artifacts within the metaverse and to provide an alternative educational experience that transcends the limitations of traditional memorization-based learning (MoNE, 2022).

The following examples illustrate the successful implementation of metaverse technologies in various sectors within the Turkish context: Ankara has become the fourth test city of the Open AR Cloud Association, preceded by Los Angeles, Helsinki, and Bari. In 2022, the state broadcaster TRT announced the advent of the world's first public broadcasting metaverse application. In 2022, the Turkish gaming industry received 20 million dollars of investment related to blockchain and the metaverse. Vodafone Turkey became the first telecommunications operator to establish a physical presence in Decentraland, a metaverse platform. Cerebrum Tech's objective is to construct a three-dimensional virtual smart city that can facilitate the achievement of sustainable development goals (Deloitte, 2022, p. 15).

In 2023, the first metaverse office was established within the Communications Directorate of the Presidency of the Republic of Turkey. The primary objective of this office is to conceptualize the Web3 transformation and elucidate the country's metaverse strategy. Its overarching aim is to highlight the significance of developments within the metaverse on a global scale (Daily Sabah, 2023).

However, to gain a comprehensive understanding of the evolution of metaverse technology in Turkey, it is essential to highlight some of the challenges and limitations that have emerged. In 2021, 97.5% of citizens aged 16-64 who use the Internet in Turkey indicated that they own a smartphone, while 68.9% stated that they own a computer. Furthermore, the cost of AR/VR devices is approximately equivalent to two minimum wages in Turkey. Furthermore, it is notable that in 2020, only 19% of citizens in Turkey had a fixed broadband subscription, which is below the EU average of 36%. In terms of mobile internet coverage, 92% of Turkey is covered by 4G networks. Given that developed countries have already begun to deploy 5G technology, Turkey must make the necessary investments without delay. Furthermore, in the initial stages of metaverse development, the significance of computing power is becoming increasingly evident. The ratio of secure servers in the EU to the number of people per million is 50,289:1, whereas in Turkey, the figure is 6,758:1. Furthermore, 41% of the Turkish population possesses fundamental IT competencies, 30% have attained intermediate proficiency, and only 3% have advanced abilities. To develop

digital skills, the Human Resources Office of the Presidency has devised training programs for public employees, which have been viewed 11.8 million times (Deloitte, 2022, pp. 32-36).

Ovesis, a company working in the metaverse, aims to become the first Turkish company to achieve unicorn status in this field. It is estimated that the global metaverse market will reach a valuation of between 700 and 900 billion dollars by 2030. It is anticipated that metaverse technology will contribute between $19.9 billion and $37.5 billion to the Turkish economy by 2035. Consequently, the company is pursuing accelerated efforts in the field of the metaverse in Turkey. The company is engaged in research activities in the fields of virtual reality (VR) and augmented reality (AR), as well as the metaverse. To illustrate, Ovesis has established the inaugural virtual shopping and living center. The objective of the metaverse strategy is to create 40,000 jobs in the virtual world by 2024 (World Newspaper, 2024).

One of the most significant eco-political issues currently facing Turkey is that of income distribution. One of the most significant contributions of the metaverse is its potential to enhance inclusion and diversity. Education can be examined in relation to this topic. As reported by the World Bank, Turkey achieved a score of 4.3 in the domain of education and social inclusion, which is below the Organisation for Economic Co-operation and Development (OECD) averages of 6.4 for education and 6.1 for social inclusion, respectively (Deloitte, 2022, p. 29). It is acknowledged that 23% of Turkey's population resides in rural areas, where access to education is more constrained. The use of the metaverse can facilitate the participation of rural areas in educational activities.

Metaverse and Turkish Education: Opportunities and Developments

The advent of metaverse technology will render the necessity for individuals seeking to learn Turkish to physically travel to a particular location obsolete. In other words, a student in Nigeria will be able to learn Turkish in the metaverse without having to travel to Turkey (Akkaya & Şengül, 2022, p. 319). Furthermore, the language teaching programs that are to be developed will enable participants to practice Turkish in a virtual city environment, in locations such as a bakery, post office, market, and bank, using avatars and different roles. Those wishing to learn Turkish may be offered the opportunity to engage in mutual language learning with avatars of Turkish masters or famous individuals, developed with the use of artificial intelligence, within virtual rooms. This approach has the potential to enhance students' motivation and concentration (Uzdu & Bilgisu, 2023, pp. 271-294). Another proposed application is the "artificial intelligence-supported speech companion" project. The Yunus Emre Institute, a language institution in Turkey, and the Turkish Language Institute, could potentially collaborate on this project through a joint program. Foreign students will have the opportunity to engage in spoken language practice with a virtual friend at any point during their daily routine. The application of artificial intelligence technology that is capable of self-improvement based on user input has the potential to facilitate the teaching of Turkish to a significant number of non-native speakers. For

instance, the presentation of Turkish traces of the historical Silk Road route to all citizens in a virtual environment is a potential application of VR/AR support. Those engaged in the study of the Turkish language, both globally and within the country, will be able to interact with one another, for instance, at a concert of the famous Turkish pop singer Tarkan, on the basis of the principle of "co-presence".

The "Turkish TV Series" application offers users the opportunity to engage with Turkish TV series in a virtual setting, replicating the experience of watching these series in their original context. It is also noteworthy that in 2023, Turkish TV series became the third most exported television content in the world. Between 2020 and 2023, there was an 183% increase in demand for Turkish TV series. While the export value of the series reached 600 million dollars, it is asserted that the series reached 750 million people in more than 170 countries. Turkish TV series are widely consumed in regions including the United States, East Asia, Russia, and Latin America (The Economist, 2024). Consequently, individuals in these geographical areas may be motivated to learn Turkish. In the context of metaverse development, the integration of language education programs for non-native Turkish speakers is a promising avenue for fostering linguistic proficiency. The use of TV series as a pedagogical tool in this endeavor holds particular promise, as it offers a convenient and engaging method of language acquisition. It is challenging for non-Turkish speakers in Latin America to identify educational resources that offer instruction in Turkish. However, the metaverse presents a potential solution, enabling individuals to engage with the language from the comfort of their homes as though they were residing in Turkey. Additionally, a Turkish language education program may be made available to the children of families who watch Turkish TV series. The establishment of appropriate virtual classrooms for children will facilitate the provision of interactive Turkish language education, incorporating games and songs.

The education of non-native speakers of the Turkish language is a significant concern for the Turkish government. The utilization of metaverse technology as an instrument for this purpose may be facilitated through the establishment of consulates and the creation of Turkish institutes. Those who have taken up residence abroad have the option of engaging in language learning with Turkish citizens in virtual classrooms. Furthermore, they may have the opportunity to gain a first-hand appreciation of the cultural riches of Turkey. This approach has the potential to address the issue of language decline as generations progress.

Furthermore, the metaverse has the potential to facilitate collective action among Turkic states in various domains, including education, health, culture, and politics (Akıllı, 2023). To achieve this, it is necessary for these states to establish a common language learning system. The establishment of a common "Turkoverse" in a virtual reality environment by Turkic states would facilitate more frequent interaction among the Turkic world's 300 million inhabitants through a range of language-culture programs. It would also provide opportunities for employment, attendance at live concerts, participation in sports

activities, viewing of films and theatre, and museum visits (Smart, 2023, p.41). Consequently, the ability to speak Turkish will become more natural for Turkic peoples.

Similarly, in the virtual language college being set up in the metaverse, citizens can experience the various dialects that exist in different cities across the country. In addition, foreigners who have learned Turkish will be able to anticipate the environments in which they will have difficulty communicating when traveling in Turkey.

At the Middle East Technical University (METU) in Turkey, Assoc. Prof. Tuğba Tokel and her students created a 3D virtual campus in 2010 (Kasap, 2021). During the pandemic, children, in particular, were unable to concentrate fully on their lessons because they were far away from school and could only use Zoom for their lessons. At this point, it has been found that interactive participation, in which students create avatars for themselves using Metaverse technology, will increase concentration. In the created virtual classrooms, all students listen to the lesson and interact with the teacher and their friends as they would in real life. In this way, students' participation in the lesson can be increased, and their social relationships with their friends can be maintained (Kasap, 2021). These new opportunities have been adapted to Turkish education.

The British Language Institute also opened a metaverse language program in Türkiye; British cities, museums, and culture are used to teach English in a virtual environment (British, 2024). These also have an impact on Turkish teaching methods.

DISCUSSION

The 21st century is often referred to as the Information Age. The development of computers, the Internet, and artificial intelligence, as well as innovative studies and investments by technology companies, have brought the world into a structure that is changing and developing more rapidly. The Metaverse, as one of these technologies, offers the possibility to change our daily activities. Business, hobbies, education, and cultural activities can be experienced in the virtual world. The aim is for the physical and virtual worlds to work together. With the rapid advancement of technological applications, including the Internet, humanity will use these tools more interactively. Therefore, a more useful universe will be created in the fields of education, health, economy, politics, psychology, and sociology (Rahman et al., 2023).

The Metaverse, as a new technology for language teaching, is increasingly being explored in various disciplines, of world literature. Improving skills and raising cultural awareness are two important aspects of language teaching that are addressed by these applications; Despite the negative performance in reading, virtual reality-based activities in listening, speaking, writing, grammar, and vocabulary teaching generally show positive results. Again, students are given the opportunity to explore and experience their learning

process; students from different cultures come together to provide an interactive educational experience, as Han and Hong have observed (2022).

The metaverse can facilitate the expression of identity and reflection of culture among language learners through the use of avatars. This, in turn, engenders a greater sincerity, comfort, and motivation on the part of the learners in the language learning process. As the use of the metaverse becomes more prevalent, it is anticipated that the very concepts of reality and self will transform, potentially giving rise to a novel societal and global order. Consequently, there may be significant alterations to the educational sector, with a need for adaptation in areas such as educational philosophy and curriculum, as underlined by Kye et al. (2021).

It is crucial to highlight some pivotal considerations regarding the utilization of the metaverse in the field of education (Park & Kim, 2022; Dwivedi et al., 2022). It is of the utmost importance that teachers and students receive comprehensive training and guidance to enable them to adapt to and utilize this novel environment. Furthermore, it is essential to recognize that this technology is merely a tool and should facilitate the development of effective pedagogical strategies by educators. Finally, the opportunities and challenges that the metaverse brings to education should be evaluated together.

Turkey has also initiated studies for the metaverse world, both at the state level and through the private sector (Kasap, 2021). To ensure the growth of the metaverse, the necessary technological infrastructure should be created, training should be provided, and institutions and organizations should carry out work with short, medium, and long-term planning. In addition, practices should be formulated with other developed countries regarding the efficient use of the learned technology in various sectors. Users in the country demand the ability to share infrastructure, hardware, platforms, and applications. However, Turkey has a long way to go in terms of infrastructure and talent. For the metaverse to be successful, a good internet infrastructure, advanced computers, and useful and affordable AR/VR devices are essential.

As demonstrated in the studies of Gün & Delen (2022) and Uzdu Yıldız & Bilgisu (2023), it can be seen that metaverse applications can enhance the ability of Turkish language learners to apply what they have learned with the spaces and scenarios that can be created in virtual worlds. For example, students can establish communication in virtual environments such as home, hospital, school, and cafe. Language teaching can be activated through a more active experience of Turkish culture in virtual environments that include various cultural practices such as weddings, funerals, and hospitality. Similarly, Turkish educators and parents' association can discuss their problems and suggestions regarding education in a virtual environment. In addition, participants from Turkey and abroad will have the opportunity to attend a conference in Turkish simultaneously, regardless of their geographical location, across different time zones. It should be noted that if a metaverse application in Turkey such as MetaAge wants to be a player in a wider metaverse system, it

should consider flexibilities such as allowing seamless movement and exchange of information across platforms.

For foreigners who want to learn Turkish, the metaverse offers the potential to gain insight into the language and culture through a variety of scenarios and settings. By communicating in Turkish in virtual worlds, these students can gain familiarity with situations they may encounter in daily life and explore Turkey's touristic regions through virtual trips. In this way, the metaverse has the potential to enhance the efficacy and enjoyment of the learning process with regard to the Turkish language. During the pandemic, the issues encountered, particularly in the context of online education, can be attributed to a decline in active student participation and an inability to derive the intended benefits from training programs that necessitate practical application. To surmount such challenges, educational platforms supported by the metaverse are capable of enhancing students' active engagement by integrating theoretical instruction with practical application. To illustrate, using practical applications, such as 3D-based aircraft maintenance simulations, can facilitate the transfer of knowledge to students and enhance their engagement. For example, 3D-based practical applications can effectively transfer information to students and increase student engagement in classes.

CONCLUSION

This study emphasizes that technology has been especially groundbreaking in the last decade. Developing educational technologies are also enhancing language education. In particular, artificial intelligence virtual environments have recently become common tools in language education, and various applications make language education more interactive, engaging, and less reliant on memorization. Despite these advancements, technological language methods are not yet widely used, both globally and in Turkey, due to their cost, applicability, and negative psychological-pedagogical effects.

As a result, the relationship between education and technology has transformed into an undeniable reality. Innovative language teaching tools and techniques promise significant contributions to both language learners and teachers. Related to this point, this study generates insights into how emerging technologies, particularly virtual and artificial intelligence-supported environments, are shaping the future of language education. However, technological transformation is a process that requires coordinated adjustment of both cost variables and the involvement of teaching staff. Currently, suboptimal infrastructural and pedagogical data create various constraints. Creating technology-integrated language learning environments can now be considered essential for a sustainable, participatory, and student-centered approach. And it should be noted that emphasizing the roles of teacher preparation, individualized learning strategies, and interdisciplinary collaboration within the vision of an effective metaverse-based education system will add productive depth.

Based on the findings of the study, the following suggestions can be made for metaverse language education both in the world and in Turkey:

For virtual education, the learner should be informed in detail, and both physical and mental preparation should be completed for the intended benefit. Pre-service teachers should be especially aware of new technological applications.

Separate studies should be conducted for each of the basic language learning skills, such as reading, writing, listening, and speaking, while comprehensive materials and content should be created in the virtual environment. Moreover, video or virtual technology should be utilized whenever possible in critical language teaching processes such as exemplification, pronunciation, and interaction. Through these applications, it ought to be determined how metaverse applications can be used in a personalized, active way, without relying on memorization.

In virtual education, content creators should be supported by diverse disciplines, including social (e.g., education, philosophy) and numerical (e.g., data scientists, artificial intelligence analysts). The technological transformation and design of virtual learning platforms should be regularly improved.

In distance education, language centers with uninterrupted Internet and constant assistance should be considered.

The development of technology-based material design in Turkish language education should be handled with an interdisciplinary approach, especially in engineering, philosophy, and education. It is valuable to gather opinions from teachers and students when designing ideal learning environments for these applications. Technological developments in the relevant field worldwide should be followed, and staying informed about new applications ensures the process is not missed.

In closing, it is anticipated that the relationship between the metaverse and education will be explored in future studies, both from technological and pedagogical perspectives. In this context, experimental and longitudinal studies can be conducted to examine the effectiveness of metaverse environments in developing the four basic language skills (reading, writing, listening, and speaking) individually. On the one hand, studies will be conducted to optimize the system by examining teacher and student perspectives on metaverse-based language education. Here, it is also important to examine the type of training and support both in-service and pre-service teachers need to use these tools effectively. On the other hand, it should be investigated how these technologies affect student motivation, attention span, and cognitive load. Studies comparing the advantages and disadvantages of virtual-technological language learning with traditional classroom instruction may be considered. Studies focusing on equal opportunities in technological access, including field observations and policy recommendations, are also worth exploring. The psychological and emotional impacts of virtual learning, such as avatar identity, fatigue, and isolation, as well as the integration of artificial intelligence into the system for

customized learning objectives, should be investigated. Finally, intercultural communication, gamification, and feedback systems in virtual learning environments should be analyzed, and efforts should be made to develop reliable assessment tools specific to virtual environments.

REFERENCES

Ağaoğlu, O., & Demir, M. (2020). The integration of 21st century skills into education: an evaluation based on an activity example. *Journal of Gifted Education and Creativity*, 7(3), 105-114.

Akkaya, N., & Şengül, L. (2022). Metaverse ve dil eğitimi [Metaverse and language education]. *Eğitim ve Yeni Yaklaşımlar Dergisi*, 5(2), 314-326. https://dx.doi.org/10.52974/jena.1194504

Akıllı, E. (2023). *Türk dünyası gençlerinin bütünleşmesinde miras diplomasisi ve metaverse* [Heritage diplomacy and the metaverse in the integration of Turkish world youth]. Ahmet Yesevi University. Retrieved from https://www.ayu.edu.tr/mypanel/_app/upload/-yayin/dosya/c24cd76e1ce41366a4bbe8a49b02a028.pdf

Aldossari, S., & Alsuhaibani, Z. (2021). Using augmented reality in language classrooms: The case of EFL elementary students. *Advances in Language and Literary Studies*, 12(6), 1-8. https://dx.doi.org/10.7575/aiac.alls.v.12n.6.p.1

Alyaz, Y., & Demiryay, N. (2023). Yabancı dil öğrenimi ve öğretiminde sanal gerçeklik uygulamaları [Virtual reality applications in foreign language learning and teaching]. *Diyalog*, 2023(1), 107-127. https://dx.doi.org/10.37583/diyalog.1312776

Bayram, A. (2022). Metaleisure: Leisure time habits to be changed with metaverse. *Journal of Metaverse*, 2(1), 1-7.

Bıçak, T. N. (2023). *Metaverse'de dil öğrenmeye yönelik ideal ortamların tasarlanmasına ilişkin öğretmen ve öğrenci görüşleri* [Teacher and student opinions on the design of ideal environments for language learning in the metaverse] [Master's thesis, İnönü University]. Yükseköğretim Kurulu Ulusal Tez Merkezi. https://tez.yok.gov.tr

Bostancı, M., & Uncu, G. (2021). Metaverse: Sanal mı gerçek mi? [Metaverse: Virtual or real?] In Y. Adıgüzel & M. Bostancı (Eds.), *Dijital iletişimi anlamak-2* [Understanding digital communication – 2] (pp. 154-169). Palet Yayınları.

British. (2024). Türkiye'nin ilk metaverse kampüsü – Eğitimde büyüleyici yeni bir devrim. [Turkey's first metaverse campus – A fascinating new revolution in education]. Retrieved from https://british.com.tr/turkiyenin-ilk-metaverse-kampusu-egitimde-buyuleyici-yeni-bir-evrim

Büyükkarabacak, N., & Balyer, A. (2024). Metaverse ve Metaverse'ün Eğitim Ortamlarına Yansımaları [Metaverse and its reflections in educational environments]. *Alanyazın*, 5(2), 224-234. https://doi.org/10.59320/alanyazin.1573637

Cheng, A., et al. (2017). Teaching language and culture with a virtual reality game. *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, 541-549. https://dx.doi.org/10.1145/3025453.3025857

Çilek, E. (2023). Yabancı dil öğretiminde yeni bir dünya: Metaverse (sanal gerçeklik) [A new world in foreign language teaching: Metaverse (virtual reality)]. In S. Karabatak (Ed.), *Eğitim & Bilim 2023-I* [Education & Science 2023-I] (pp. 77-95). Efe Yayıncılık.

Cruz-Lara, S., et al. (2010). Language teaching in virtual platforms: Advances, problems, and future directions. *Language and Technology Journal*, 5(2), 87-102.

Daily Sabah. (2023). Turkey officially launches its 1st metaverse office. Retrieved from https://www.dailysabah.com/business/tech/turkiye-officially-launches-its-1st-metaverse-office

Das, T., Ganesh Kondamudi, S., Dawood Babakerkhell, M., Pal, D., Roy, R., & Funilkul, S. (2024). Intention for enhancing metaverse-based learning using gamification among university students: a study using Delphi and structural equation modelling approaches. *Cogent Business & Management*, 11(1). https://doi.org/10.1080/23311975.2024.2380016

Dean, R. (2022). Roblox user statistics. *Digital Game Studies*, 8(4), 45-60.

Deloitte. (2022). *The metaverse and its potential for Türkiye*. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/tr/Documents/consulting/Deloitte-The-Metaverse-and-its-Potential-for-Turkiye.pdf

Díaz, J. E. M., Saldaña, C. A. D., & Avila, C. A. R. (2020). Virtual world as a resource for hybrid education. *International Journal of Emerging Technologies in Learning*, 15(15), 94-109. https://dx.doi.org/10.3991/ijet.v15i15.13025

Duan, Y., et al. (2021). Metaverse and education: New approaches in distance education. *Educational Technologies Research*, 6(3), 72-89.

Dünya Newspaper. (2024). Ovesis, Türkiye'nin metaverse alanındaki ilk unicorn'u olmayı hedefliyor. [Ovesis aims to become Turkey's first unicorn in the metaverse sector]. Retrieved from https://www.dunya.com/sektorler/teknoloji/ovesis-turkiyenin-metaverse-alanindaki-ilk-unicornu-olmayi-hedefliyor-haberi-716567

Durana, C., Krulicky, M., & Taylor, E. (2022). Metaverse and business meetings: New transformations. *Business and Technology Journal*, 11(2), 103-118.

Dwivedi, Y. K., et al. (2022). Metaverse and work environments: Innovation and implementation. *International Business Research Journal*, 15(1), 89-105.

Garrido-Iñigo, P., & Rodríguez-Moreno, M. (2015). The impact of virtual airport usage on tourism students' motivation to learn French. *Tourism Research Journal*, 2(1), 45-56.

Guo, H., & Gao, W. (2022). Metaverse-powered experiential situational English-teaching design: An emotion-based analysis method. *Frontiers in Psychology*, 13. https://doi.org/10.3389/fpsyg.2022.859159

Gün, M., & Delen, K. (2022). A design example of digital-based material in teaching Turkish as a foreign language: The use of metaverse applications. *Journal of History School*, 61, 4467-4486.

Hirsh-Pasek, K., et al. (2022). Metaverse in education: Future visions. *Educational Technology and Innovation Journal*, 10(2), 5-18.

Hürriyet Daily News. (2021). Istanbul's virtual lands sold in scramble in metaverse world. Retrieved from https://www.hurriyetdailynews.com/istanbuls-virtual-lands-sold-in-scramble-in-metaverse-world-170449?utm_source=chatgpt.com

Kasap, S. (2021). Turkish researchers develop technology that brings schools into the metaverse. Retrieved from https://www.aa.com.tr/tr/bilim-teknoloji/turk-arastirmacilardan-okullari-metaverse-ortamina-tasiyan-teknoloji/2446867

Kim, M., Sim, J., & Ryu, S. (2022). A Study on foreign students'perception of Metaverse-Based Korean language course as General Education. *Korean Journal of General Education*, 16(6), 183-195.

Kye, B., et al. (2021). Metaverse and distance education: New opportunities and challenges. *Technology in Education Association Journal*, 12(4), 54-67.

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

MEB (Turkish Ministry of National Education). (2022). Metaverse karma gerçeklik atölyemiz açıldı [Our metaverse mixed-reality workshop has opened]. Retrieved from https://orgm.meb.gov.tr/www/metaverse-karma-gerceklik-atolyemiz-acildi/icerik/2076

Mystakidis, S. (2022). Metaverse and education: New perspectives and applications. *Educational Technology Research*, 7(1), 88-104.

Ng, D. T. K. (2022). What is the metaverse? Definitions, technologies, and the community of inquiry. *Australasian Journal of Educational Technology*, 38(4), 190-205. https://dx.doi.org/10.14742/ajet.7945

O'Leary, Z. (2017). *The essential guide to doing your research project*. SAGE Publications Inc.

Öner, G. (2022). Sosyal bilgiler eğitiminde metaverse [Metaverse in social studies education]. In Y. Doğan & N. Şen Ersoy (Eds.), *Eğitimde metaverse: Kuram ve uygulamalar* [Metaverse in education: Theory and practices] (pp. 115-132). Efe Yayınları.

Park, H., & Kim, S. (2022). Metaverse and Generation Z: New approaches in education. *Digital Education Research*, 9(3), 134-150.

Rahman, K. R., Shitol, S. K., Islam, M. S., Iftekhar, K. T., et al. (2023). Use of Metaverse Technology in Education Domain. *Journal of Metaverse*, 3(1), 79-86. https://doi.org/10.57019/jmv.1223704

Reisoğlu, I., Topu, B., Yılmaz, R., Karakuş Yılmaz, T., & Göktaş, Y. (2017). 3D virtual learning environments in education: A meta-review. *Asia Pacific Education Review*, 18(1), 81100. https://doi.org/10.1007/s12564-016-9467-0

Schweitzer, J., & Rizzo, A. (2022). Metaverse and examination environments: Innovations in health education. *Health Education Research*, 5(2), 42-58.

Sutopo, A. H. (2023). *The future of education: How the metaverse is changing the learning*. Large print.

Süleyman Demirel University. (2023). Türkiye'nin ilk metaverse odaklı ön kuluçka merkezi 'Metaverse Girişim Stüdyosu' SDÜ'de açıldı [Turkey's first metaverse-focused pre-incubation center 'Metaverse Entrepreneurship Studio' opened at SDÜ]. Retrieved from https://w3.sdu.edu.tr/haber/11462/turkiyenin-ilk-metaverse-odakli-on-kulucka-merkezi-metaverse-girisim-studyosu-sdude-acild

Şimşek, İ., Erbay, H. N. ve Kirişçi, M. (2019). Üç boyutlu sanal öğrenme ortamında 5. Sınıf düzeyinde kesirlerin öğretimi: Second life örneği. [Teaching fractions at the 5th-grade level in a three-dimensional virtual learning environment: The Second Life example] *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, 20(1), 139-154. https://dx.doi.org/10.29299/kefad.2018.20.01.005

Tamai, M., et al. (2011). Constructing Situated Learning Platform for Japanese Language and Culture in 3D Metaverse. *Second International Conference on Culture and Computing*, 189–190. http://doi.org/10.1109/Culture-Computing.2011.59

The Economist. (2024). The third-largest exporter of television is not who you might expect. Retrieved from https://www.economist.com/culture/2024/02/15/the-third-largest-exporter-of-television-is-not-who-you-might-expect

Tlili, A., Huang, R., Shehata, B., Liu, D., Zhao, J., Metwally, A. H. S., Wang, H., Denden, M., Bozkurt, A., Lee, L.-H., Beyoglu, D., Altinay, F., Sharma, R. C., Altinay, Z., Li, Z., Liu, J., Ahmad, F., Hu, Y., Salha, S., Abed, M., & Burgos, D. (2022). Is metaverse in education a blessing or a curse: A combined content and bibliometric analysis. *Smart Learning Environments, 9*(1), 24. https://doi.org/10.1186/s40561-022-00205-x

Turan, U. N., Emre, İ. E., & Kıran, S. (2022). Metaverse İle İlgili Türkçe Dilindeki Çeşitli Sosyal Medya Platformu Verileri İle Duygu Analizi [Sentiment analysis using Turkish-language social media data about the metaverse]. *Journal of Information Systems and Management Research*, 4(2), 1-16.

Uzdu Yıldız, F., & Bilgisu, F. (2023). Metaverse araçları çocuklara yabancı dil olarak Türkçe öğretirken nasıl kullanılabilir? [How can metaverse tools be used to teach Turkish as a foreign language to children?]. *Aydın TÖMER Dil Dergisi*, 8(2), 271-294. https://doi.org/10.17932/IAU.TOMER.2016.019/tomer_v08i2004

Ural, N. (2021). Yabancı dil öğretiminde sanal gerçeklik kullanımı [The use of virtual reality in foreign language teaching]. In H. Asutay (Ed.), *Dil öğretiminde yeni teknik ve yöntemler* [New techniques and methods in language teaching] (pp. 145-161). Paradigma Akademi.

Üçgül, M., Lüy, Z., Baskaya, M., Keleş, E. (2022). Tarih Öğretimine Yönelik 3B Sanal Ortamın Değerlendirilmesi: Pilot Çalışma [Evaluation of a 3D virtual environment for history teaching: A pilot study]. *Mersin Üniversitesi Eğitim Fakültesi Dergisi*, 18(1), 96-115. https://doi.org/10.17860/mersinefd.935407

Yıldırım, P., & Keçeci, G. (2024). Metaverse ve eğitim: Yeni bir dönem başlıyor [Metaverse and education: A new era begins]. *Millî Eğitim*, 53(243), 1635-1654. https://dx.doi.org/10.37669/milliegitim.1240070

Author Contributions

The sole author of this research, Elif Ermağan, was responsible for the conceptualization, methodology formulation, data collection, analysis, and interpretation. Furthermore, Elif Ermağan took charge of drafting the initial manuscript, revising it critically for vital intellectual content, and finalizing it for publication. The author has read and approved the final manuscript and takes full accountability for the accuracy and integrity of the work presented.

Author(s)' statements on ethics and conflict of interest

Ethics statement: I hereby declare that research/publication ethics and citing principles have been considered in all the stages of the study. I take full responsibility for the content of the paper in case of dispute.

Statement of interest: The author declares that there is no conflict of interest regarding the publication of this paper.

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Biographical notes:

Elif Ermağan: Lecturer Dr. Elif Ermağan teaches Turkish to foreigners at Istanbul Medeniyet University and studies in the same field. She has many books and articles. Her main areas of study are teaching Turkish as a foreign language, bilingualism, migration, and language learning.

Scopus Author Identifier Number: N/A

Web of Science Researcher ID: MBH-5504-2025

Google Scholar Researcher ID: 7ogAPeYAAAAJ