DIGITALISATION OF EDUCATION

https://doi.org/10.28925/2518-7635.2022.78

TEACHER STUDENTS TRAINING TO IMPLEMENT AR AND VR TECHNOLOGIES IN FOREIGN LANGUAGE TEACHING

Yuliia Rudnik
ORCID 0000-0002-5171-4762
PhD in Pedagogy
Senior lecturer of the Foreign languages and methodology department,
Borys Grinchenko Kyiv University,
18/2 Bulvarno-Kudyavska Str., 04053 Kyiv, Ukraine,
y.rudnik@kubg.edu.ua

ABSTRACT

The article is devoted to the problem of students' training at the first educational level of pedagogical specialities (Primary and Preschool education) to the implementation of augmented and virtual reality technologies in foreign language teaching. The notions of AR and VR technologies are clarified, and the necessity and specifics of the use of AR and VR technologies in foreign language teaching are explained. The article observes the use of AR and VR technologies in foreign language teaching as an essential part of the digital competence of the modern teacher. The choice of teaching methods, technologies, and tools in foreign language teaching is emphasised. Therefore, the professional training of pedagogical speciality students'(the first education level) significance is grounded. The depicted examples of such training are based on the working curriculum of the discipline "Mobile learning technology in foreign language teaching of preschool children". This discipline is designed for the students of 012 Preschool education at Borys Grinchenko Kyiv University. This article focuses on the module "Mobile learning technology in foreign language teaching of preschool children," which involves mastering AR technologies in teaching a foreign language at the preschool. The expected learning outcomes for the first education level pedagogical speciality students regarding their professional training to use AR and VR technologies in foreign language teaching are discussed.

Keywords: *AR technologies; digital competence; foreign language teaching; teacher students; training; VR technologies.*

INTRODUCTION

The COVID-19 pandemic has accelerated the digitalisation of higher and secondary education worldwide. In Ukraine, higher educational institutions and schools faced challenges with the digital transformation of education and the emergency transition to synchronous distance learning. Nonetheless, national university and school students showed their satisfaction with distance online education during the pandemic and chose it as a promising format of education in the future (Mospan et al., 2022; Mospan & Sysoieva, 2022).

Consequently, the rapid digitalisation of educational services requires a modern teacher to develop digital competencies and obtain particular skills in terms of computer literacy, utilising digital tools in an educational environment, assessment, and self-development. Since the process is characterized by its ongoing nature, more technologies appear and are implemented in the educational sphere to improve its quality as well as student motivation. Among the recent educational trends, the concepts of Augmented Reality (AR) and Virtual Reality (VR) are becoming widely discussed (Castaño-Calle, et al., 2022: Jumani et al., 2022; King et al., 2022: Lampropoulos et al., 2022: Tan et al., 2022), which requires specific attention to the possibilities and challenges offered by the aforementioned technologies within the lens of the professional training of pedagogical speciality students to their use of the aforementioned technologies in their future professional activities.

PROBLEM STATEMENT

Professional training of student teachers to utilise AR and VR technologies in foreign language teaching requires specific attention in terms of the popularity they gain and has become extremely important since the concepts of AR and VR have become more and more common in the field of education. The question of the use of the aforementioned

technologies in education is already being investigated in terms of higher education and professional training of students of particular specialities and employees training. For instance, surgeons and soldiers have already experienced VR training, and such experience has become increasingly popular and widely used worldwide. This highlights the potential of AR and VR technologies in education and in professional training of pedagogical speciality students specifically to teach them skills necessary to implement the AR and VR technologies in the classroom environment in terms of primary and preschool students' foreign language learning.

BACKGROUND

The constant development of the requirements for the pedagogue is caused by several factors. First is the transformation of the whole education sphere, specifically higher education, due to its integration into the European Higher Education Area, which started in 2005 from the Bologna declaration. Second is the shift to distance learning in terms of the COVID-19 pandemic and the rapid implementation of various digital tools and technologies that accompanied the aforementioned process. In terms of the digitalization of the learning process and the necessity to develop a digital competence of students of pedagogical speciality, the questions of the use of innovative technologies in the process of their professional training arose. Finally, the rapid changes and realities that modern societies deal with provoke the cardinal changes in the list of requirements and demands that social expectations form the image of a contemporary pedagogue. All of these factors emphasize the need to investigate the potential of AR and VR technologies in education, specifically in language learning, and how to integrate the received knowledge into the professional training process of modern pedagogical speciality students. Various aspects of professional training of the students of pedagogical speciality were analysed by scholars. For example, Kotenko & Holovatenko (2020) investigate foreign language primary school teachers' training in Ukraine. Kosharna (2021) represented the European experience of teacher training. Petryk (2021) studies the media didactic support of foreign language primary school teachers' training. Nezhyva & Palamar (2021) analyse the training of future primary school teachers in terms of the urgency of the use of AR in

literacy and literary reading lessons. In addition, Karacan & Kemal (2021) consider AR technology as an educational tool for foreign language education. Studying this question, Parmaxi & Demetriou (2020) show that AR in language learning depend on devices used, software installed, levels of education involved, languages presented, and the theoretical framework of AR. Despite the mentioned research, the aspect of the need for professional training of pedagogical speciality students in AR and VR technologies use in their future professional activities was not comprehensively studied and revealed in scientific literature.

METHODOLOGY

The objective can be stated as follows: emphasizing the education potential of AR and VR technologies in language learning to prove the functionality and significance of their integration into the process of professional training of students of pedagogical specialities. To achieve the formulated goal of the paper, the methods of observation, descriptive investigation, as well as study and generalization of scientific publications were used.

RESULTS

The shift that occurs in pedagogy from the use of traditional methods to their digitalization is supported by the emergence of innovations in terms of technologies. Since today digital technologies allow for updating of the learning process both in preschool and primary education in terms of the new societal expectations, the professional training of pedagogical speciality students should also be transformed accordingly. Several disciplines allow them to do it within the content of future teachers' professional training. Before analysing the changes considering the discipline's content, it is necessary to analyse the education potential the AR and VR technologies can offer in the aforementioned process.

It is well-known that the modern generation is surrounded by technological advancements. Digital technologies continue to develop, and more and more innovations such as AR technology and VR technology constantly appear in Education Market. While AR technology is being analysed in scientific literature and considered one of the most influential during the next decade (Alakärppä et al., 2017), the potential of VR technology

is still being investigated due to specific circumstances that are discussed further in the paper. Nevertheless, both technologies are forecasted to grow in the Education Market, which makes studying their educational potential, advantages, and disadvantages, as well as the ways of implementation in the modern classroom, very topical.

While both AR and VR technologies offer unique learning experiences, they differ in their nature. AR technologies work with the help of mobile devices that add various digital information to the physical elements in the environment (Augmented and Virtual reality, 2018). VR technologies involve complete immersion in the digital simulation of a world where users can interact with different objects and environments (Augmented and Virtual reality, 2018). Despite the highlighted difference in their functions, both are proven to offer several benefits when used in the education environment, particularly language learning.

The difference between AR and VR technologies allows us to create completely different learning experiences and adapt the aforementioned categories to different age categories. Since there are age limitations to the use of VR technologies (the typical age limitation for VR gaming is 7+, which further differs based on the manufacturer of the headset, for instance, it is 12 for SONY's play station VR and 13+ for Oculus Rift and Samsung's Gear VR. Due to these measures, we could advise the use of VR technologies for the children of primary school and the elder, while AR technologies could be offered for children of preschool educational institutions, but with a strict time limit and wise attitude.

Among the factors mentioned by the researchers that contribute to the use of AR in foreign language learning, several groups are mentioned: improved motivation, satisfaction, attention, engagement, and enjoyment; enhanced learning performance regarding multiple language skills; reinforcement of interactions between stakeholders and ample opportunities for authentic language tasks (Parmaxi & Demetriou, 2020). As it was aforementioned before, the use of AR technology in foreign language learning is observed within multiple language skills, which are reading, writing, listening, speaking, vocabulary acquisition, comprehension, pronunciation, phonics, and general language

skills. Nevertheless, recent research analysis proves that in the majority the main focus of AR in terms of foreign language learning is communication (Parmaxi & Demetriou, 2020). To achieve any of the set aims in the classroom, different types of AR technology are used. Thus, Karacan & Kemal (2021) offer to review AR Applications in terms of three major groups that are namely: Image-based AR, Markerless AR, and Creation-based AR, represented in Figure 1.

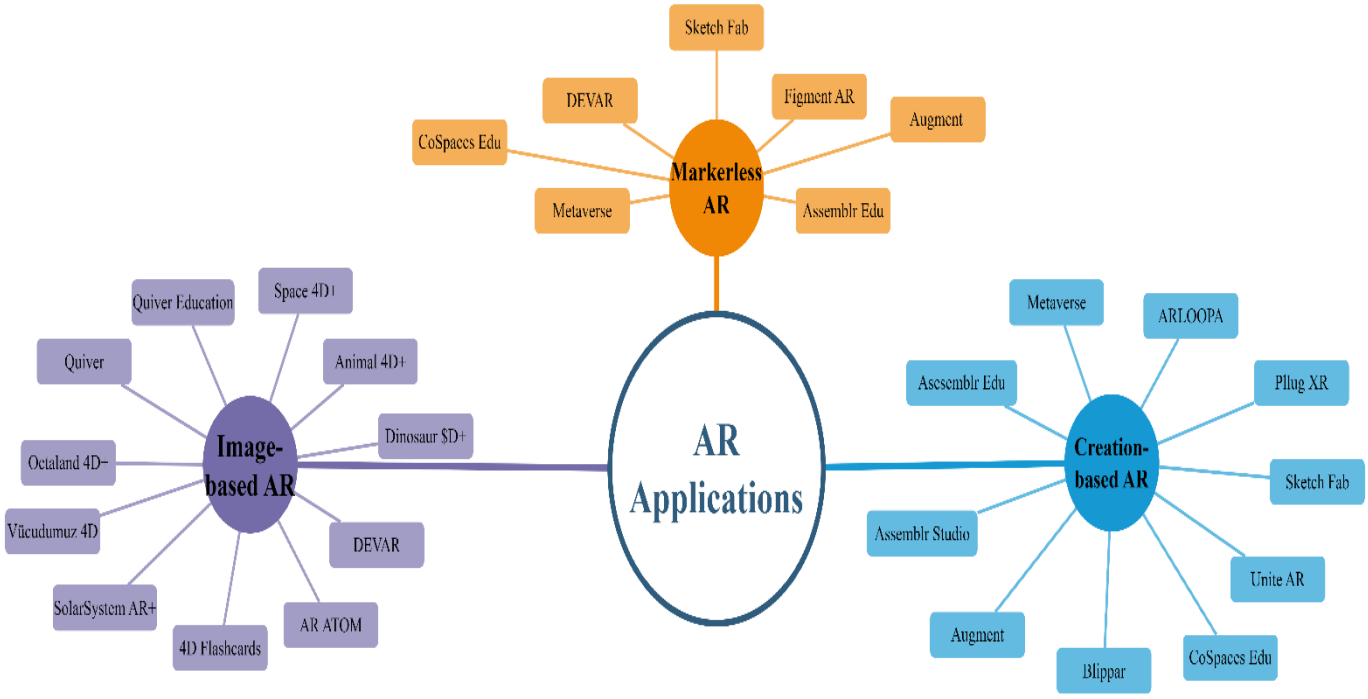

Figure 1. The mind map of AR Applications classification
(adopted from Karacan & Kemal, 2021)

The first category of the aforementioned applications offers rather limited functionality since it only works with sets of flashcards that require physical or online purchases. The second category, which often includes the software that could belong to both the second and third categories, includes the ready-to-use materials. Finally, the third category allows creating users their AR products that could have individual settings.

Currently, VR technology is still associated mostly with the video gaming industry, high school and university students have already experienced the benefits of the use of VR technology in their training since it attracted the attention of educators of specific fields

such as medicine, chemistry, biology, etc. particularly abroad while it is only making a path in foreign language learning in Ukraine. Though the first VR applications emerged in the late 60s, they were never specifically designed for language learning purposes and became popular recently. Among the certain advantages of the use of VR is overcoming the difficulties that appear in terms of language learning in real life that are conditioned by time, geographical and financial restrictions in terms of communication and interaction with native speakers as well as the use of target language in the situations of communication due to ability to create a simulated close to reality authentic environment (Panagiotidis, 2021). Thus, VR technology not only offers the contextual presence for language learning but also is based on pedagogical theories, which makes its use in education justified.

Nowadays, the classification of VR systems singles out three of its categories (non-immersive, semi-immersive, and fully immersive VR) that could be realized in language learning depending on the different technologies (Panagiotidis, 2021). Except for hardware, which became available for a large mass market in 2016 the specific software is what makes VR experience possible. Based on the classification offered by Lan (2020) that is applied for language education, the VR applications could be distinguished according to the various pedagogical purposes between five singled-out categories that are revealed in Table 1.

Table 1. The classification of VR applications for language learning (by Lan, 2020)

Category of VR application	**Example of the software**
Entertainment	VR games: WoW
Social networking	Open Sim Platform, Second Life, Active worlds
Visual experiences	Google Expeditions and Discovery VR-based software (Google Earth VR)
Creation	Minecraft Realms
Operation	Simulations and 3D objects manipulation (Influent)

Some factors slow down the tempo of the integration of AR and specifically VR technologies in the education sphere. The first and the most serious factor is the cost of the hardware that is necessary to implement the VR technologies in the modern classroom (The price ranges from $400 (Meta Quest 2) to several thousand dollars depending on the model). It is worth mentioning that except for the headset purchase, there are compulsory requirements for the PC system recommendations, specifically for the Graphic Card (GPU). The second factor is the number of available software (free and paid-for) and the time and costs it takes to develop the new one. Nevertheless, despite all the aforementioned issues and critics of the technologies, they already demonstrate and prove the educational potential.

Despite the rapid development and improvement of the learning process, for instance, the use of the augmented reality application Fast AR Kids in primary schools in Ukraine, still the use of similar technologies is limited and is not characterized by systematic character (Nezhyva & Palamar, 2021). Moreover, it lacks the proper methodologies and skills of modern pedagogues to use the aforementioned tools in the education process. Also, the use of either AR or VR technologies is not foreseen by the standard syllabus of the educational establishments, while the need for professional training of the pedagogical speciality students and formation of their readiness to implement AR and VR technologies in the classroom setting has already been grounded (Nezhyva & Palamar, 2021). All of these emphasize the need to investigate the way AR and VR technologies could be integrated into the professional training of pedagogical speciality students.

Based on the experience of professional training of pedagogical speciality students at the Faculty of Pedagogical Education of Borys Grinchenko Kyiv University, the specific training for the future AR and VR technologies use in the professional career has already started. In particular, the working curriculum of the discipline “Modern technologies of teaching a foreign language to preschool children” for first education level students of 012 Preschool education speciality was updated this year (Rudnik, 2022). The changes pertain to the content of the 10th module of the discipline, which is taught in the 2nd, 3rd, and 4th courses within 12 modules. With the appearance of the topic devoted to Mobile learning technologies of foreign language learning to preschool children, the content of the module

transformed as well. During the 7 classes of module 10, future preschool teachers get acquainted with the basics of AR and VR technology and the specifics of various applications, their functionality, and applicability to the defined age category of students and their learning needs.

To manage mobile learning use, the aspects of AR technologies use for preschoolers and VR technologies for primary school students to grant continuing education between preschool and primary education institutions are overviewed and practised during the number of practical classes. Students get acquainted with the available software (e.g., AR Flashcards-Animal Alphabet, Mondly AR, and Catchy Words AR), install it on their devices, and practice using it as well as create the how-to videos on the specific applications that prove the improvement of the level of their methodological and teaching English level skills. Then, the videos are shared and discussed with their group mates to allow them to get acquainted with more useful AR and VR applications during the limited-time frame.

In terms of their self-study, students of 012 Preschool education speciality create infographics while they learn about the benefits of AR and virtual reality tools in foreign language learning to preschool children, as well as create their playlists on their YouTube channels with the best examples of the implementation of AR or VR software in language education. Also, they make useful lists of applications that could be implemented during foreign language learning with preschool children and argument their choices. Thus, preschool education speciality students learn to use the benefits of AR and VR technologies in foreign language learning and develop their life-learning skills since they live in an epoch of rapid changes and quick improvements where education professionals should constantly improve and upgrade their knowledge about what is on and popular in Education Market.

CONCLUSIONS AND PROSPECTS

The overview of the potential of the use of AR and VR technologies in education, particularly in foreign language learning, proves the necessity of further investigation of the topic. Despite the existing limitations to the complete VR technology implementation

in the modern foreign language learning classroom environment demonstrates very promising benefits and requires specific attention, support and implementation, while AR technology has already been partially introduced in primary school. The defined advantages of the aforementioned technologies make the creation of educational content and its investigation the prospect of further research as well as the more detailed analysis of the ways of integration of AR and VR technologies in pedagogical speciality students' professional training, particularly investigating their level of readiness to use the AR and VR in their future professional activities.

REFERENCES

Alakärppä, I. et al. "Using Nature Elements in Mobile AR for Education with Children." *Proceedings of the 19th International Conference on Human-Computer Interaction with Mobile Devices and Services*, 2017.

Augmented and Virtual reality. (2018). Observatory of Educational Innovation. https://static1.squarespace.com/static/5475f6eae4b0821160f6ac3e/t/6112a237c03c5113bbaa409d/1628611128568/12.+Edu+Trends+-+AR%26VR.pdf

Castaño-Calle R, Jiménez-Vivas A, Poy Castro R, Calvo Álvarez MI, Jenaro C. (2022). Perceived Benefits of Future Teachers on the Usefulness of Virtual and Augmented Reality in the Teaching-Learning Process. *Education Sciences*, *12*(12), 855. https://doi.org/10.3390/educsci12120855

Jumani, A.K., Siddique, W.A., Laghari, A.A., & Ahad, A. (2022). Virtual Reality and Augmented Reality for Education. In Tiwari, R., Duhan, N., Mitta, M., Anand, A., & Khan, M.A. (Eds).

Multimedia Computing Systems and Virtual Reality, 1-st Edition, Chapter 9, (pp.189-210). Taylor & Francis. DOI:10.1201/9781003196686-9

King S, Boyer J, Bell T, Estapa A. (2022). An Automated Virtual Reality Training System for Teacher-Student Interaction: A Randomized Controlled Trial. *JMIR Serious Games, 8*, 10(4), e41097. doi: 10.2196/41097.

Karacan, C. G., & Kemal, A. Educational Augmented Reality Technology for Language Learning and Teaching: A Comprehensive Review. *Shanlax International Journal of Education, 9*(2), 2021, 68-79. https://doi.org/10.34293/education.v9i2.3715

Kosharna, N. (2021). Modern European experience of practical teacher training. *Educological discourse, 1(32)*, 143-155. https://doi.org/10.28925/2312-5829.2021.1.10

Kotenko, O., & Holovatenko, T. (2020). Models of foreign language primary school teacher training in the EU. Innovative Scientific Researches: European Development Trends and Regional Aspect. Riga: Baltija Publishing. 92–115. https://doi.org/10.30525/978-9934-588-38-9-5

Lampropoulos G, Keramopoulos E, Diamantaras K, Evangelidis G. (2022). Augmented Reality and Virtual Reality in Education: Public Perspectives, Sentiments, Attitudes, and Discourses. *Education Sciences, 12*(11):798. https://doi.org/10.3390/educsci12110798

Lan, Y.J. (2020). Immersion, interaction, and experience-oriented learning: Bringing virtual reality into FL learning, *Language Learning and Technology, 24*(1), 1-15.

Nezhyva, L., & Palamar, S. (2021). Preparation of future primary school teachers for the use of augmented reality in literacy and literary reading lessons. *Educological discourse, 2(*33*),* 144-159. https://doi.org/10.28925/2312-5829.2021.2.11

Mospan, N.V., Ognevyuk, V.O., & Sysoieva, S.S. (2022). Emergency Higher Education Digital Transformation: Ukraine's Response to the COVID-19 Pandemic, *Information Technologies and Learning Tools, 89*(3), 90–104. https://doi.org/10.33407/itlt.v89i3.4827

Mospan, N.V., & Sysoieva, S.O. (2022). Trends in Digital Adaptation of Schools During the COVID-19 Pandemic, *Information Technologies and Learning Tools, 91*(5), 21–35. https://doi.org/10.33407/itlt.v91i5.5063

Panagiotidis, P. (2021). Virtual Reality Applications and Language Learning. *International Journal for Cross-Disciplinary Subjects in Education, 12*(2). https://doi.org/10.20533/ijcdse.2042.6364.2021.0543

Parmaxi, A., & Demetriou, A. (2020). Augmented reality in language learning: A state-of-the-art review of 2014–2019. *Journal of Computer Assisted Learning*, 1–15. https://doi.org/10.1111/jcal.12486

Petryk, L. (2021). Media didactic support of the process of future primary school teachers' foreign language training. *Educological discourse, 1(*32*),* 112-128. https://doi.org/10.28925/2312-5829.2021.1.8

Rudnik, Y.V. (2022). *Suchasni tekhnolohii navchannia ditei doshkilnoho viku inozemnoi movy (2-4 kurs, Doshkilna osvita): elektronnyi navchalnyi kurs dlia studentiv spetsialnosti 012 Doshkilna osvita* [Modern technologies of teaching a foreign language to preschool children: (2nd-4th years, Preschool education): e-course for Preschool education students]. Borys Grinchenko Kyiv University. https://elibrary.kubg.edu.ua/id/eprint/42205/1/RPND_STNIMDDV_2-4%20_DO.pdf

Tan, Y., Xu, W., Li, S., Chen, K. (2022). Augmented and Virtual Reality (AR/VR) for Education and Training in the AEC Industry: A Systematic Review of Research and Applications. *Buildings*, 12, 1529. https://doi.org/10.3390/buildings12101529

ПРОФЕСІЙНА ПІДГОТОВКА СТУДЕНТІВ ПЕДАГОГІЧНИХ СПЕЦІАЛЬНОСТЕЙ ДО ЗАСТОСУВАННЯ AR ТА VR ТЕХНОЛОГІЙ У НАВЧАННІ ІНОЗЕМНИХ МОВ

Юлія Руднік, кандидат педагогічних наук, старший викладач кафедри іноземних мов і методик їх навчання Київського університету імені Бориса Грінченка. вул. Бульварно-Кудрявська 18/2, 04053 Київ, Україна, y.rudnik@kubg.edu.ua

Стаття присвячена проблемі підготовки студентів першого освітнього рівня педагогічних спеціальностей (Початкова та Дошкільна освіта) до використання AR та VR технологій у навчанні іноземних мов. Уточнюються поняття AR та VR технологій, пояснюється необхідність та специфіка використання AR та VR технологій у навчанні іноземних мов. У статті розглядається використання AR та VR технологій у навчанні іноземних мов як важлива складова цифрової

компетентності сучасного вчителя. Акцентовано увагу на виборі методів, технологій та засобів навчання іноземної мови. Тому обґрунтовано значення професійної підготовки студентів педагогічних спеціальностей першого освітнього рівня. Наведено приклади такої підготовки на основі робочої програми навчальної дисципліни «Сучасні технології навчання дітей дошкільного віку іноземної мови», що викладається в Київському університеті імені Бориса Грінченка, розробленої для студентів спеціальності 012 «Дошкільна освіта» саме в частині опанування модуля «Технології мобільного навчання у навчанні дітей дошкільного віку іноземної мови», яка передбачає опанування використанням AR-технологій у навчанні іноземної мови в дитячому садку. Обговорено очікувані результати навчання студентів першого освітнього рівня педагогічних спеціальностей щодо їх професійної підготовки до використання AR та VR технологій у навчанні іноземних мов.

Ключові слова: *технології AR; цифрова компетентність; іноземні мови; студенти педагогічної спеціальності; професійна підготовка; VR технології.*

Received: 25.10.2022
Accepted: 31.12.2022