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PEDAGOGICAL STRATEGIES WITH IMMERSIVE TECHNOLOGIES FOR TEACHING AND LEARNING THE JAPANESE LANGUAGE

Abstract. The article addresses the choice of pedagogical strategies for application of immersive technologies in foreign language teaching and learning, using the Japanese language as an example. The authors defined and substantiated the main pedagogical strategies using immersive technologies: inquiry-based approach, project-based learning, mixed learning, flipped learning, mobile learning, game learning, joint learning, and independent learning. A study was conducted on the aspects of application of immersive technologies by 3rd year students of the Education and Research Institute of Philology of the Taras Shevchenko National University of Kyiv during their educational projects. The students' attitude to pedagogical strategies using augmented and virtual reality was analyzed. It has been determined that it is difficult for students to apply these technologies, because they do not have enough experience of using them in language learning. Nevertheless, these tools significantly help them in the formation and development of research skills, digital competence, expand their ability to use information and communication technologies in learning Japanese. In our further research, we plan to actively implement augmented and virtual reality in the teaching of the Japanese language to students using basic pedagogical strategies, especially through the inquiry-based approach and project-based learning, combined with other applicable pedagogical strategies - such as blended learning, flipped learning, mobile learning, game-based learning, collaborative learning and self-directed learning.

Keywords: immersive technologies; augmented reality; virtual reality; Japanese language learning; pedagogical strategies, intercultural communication.

1. INTRODUCTION

Information and communications technologies (ICT) assume an important role in all areas of our society. Schools and universities, acting as a ground for formation of 21st century skills in young people, should be able to satisfy the needs and overcome the difficulties that students have, preparing them for the constant development of technologies.

The inclusion of new technologies in the educational context opens up new opportunities for teachers to innovate in their teaching methods and creates conditions for students to overcome learning difficulties and strengthen their 21st century skills. At the same time, it is important for the teacher to use various pedagogical strategies, which can be based on immersive technologies (ITs).

The problem statement. Pedagogical strategies have different definitions.

A. Muelas, E. Navarro note that a pedagogical strategy is a model of cognitive operations aimed at guiding students to understand the problem, their research and the correct solution to

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this problem [1]. Researchers have considered pedagogical strategies as procedures and methods that are used during the planning of student learning, which have goals and educational content related to their processing of new information to achieve understanding of educational material. Creating a quality learning process requires a variety of learning strategies that are appropriate for the learning environment or situation.

Pedagogical strategies utilizing augmented and virtual (AR/VR) technologies are essential to create a learning environment that can provide students with new methods to interact with different devices alongside with opportunities for collaboration between students themselves and between students and teachers, which can potentially increase learning motivation [2].

Our research examines the application of augmented and virtual reality with the third-year Philology students of the Taras Shevchenko National University of Kyiv, aimed at solving tasks in educational projects, where they need to research the topic and make their own projects to practice Japanese at different levels of education, in particular, learn complex Japanese grammatical constructions, as well as master linguistic and cultural aspects of the Japanese language.

Analysis of recent studies and publications. A number of studies have uncovered the significant potential of immersive technologies in language learning, such as: AR in language learning, including their impact on increasing motivation among Chinese college students learning English (S. Li and Y. Chen, 2014 [3]); study on the influence of adventure games on English reading confidence, motive and self-efficacy (Lu, Lou, Papa & Chung, 2011 [4]); introduction of VR and AR features of Google Earth application for foreign language learning, including the Japanese language, which allows users to visit different locations throughout the world, meanwhile supporting their own learning of various studies i.e. history, political studies, international relations, etc. (Frazier, Erin & Bonner, Euan & Lege, Ryan, 2019 [5]); encouraging students to speak the Spanish language outside of classroom with game-based pedagogical strategies (Holden & Sykes, 2011 [6]); impact of Augmented Reality game on learning words in different languages (J. Barreira, M. Bessa, L.C. Pereira, et al., 2012 [7]); impact of Immersive language learning environments on student's English language learning (X. Huang, G. Han, J. He, et al., 2018 [8]); the role of ITs in the development of intercultural competence of students studying a foreign language (X. Zhang, M .Zhou, 2019 [9]).

Researchers draw attention to the fact that while applying immersive technologies, one should especially adhere to the methods of mixed learning and use game-based pedagogical strategies. They found that the main advantage of learning with AR and VR over traditional teaching methods is that the student is given the opportunity to feel (rather than imagine) the subject, situation or scenario which cannot be demonstrated or described using traditional teaching methods.

Since a very limited number of applications and IT content are available for language education, we will describe a possible utilization of ITs (VR and AR) for the Japanese language learning combined with different pedagogical strategies and students' experience.

The research goal. The purpose of the article is to highlight pedagogical strategies of application of augmented and virtual reality for organizing the language learning - especially for supporting and organizing the Japanese language learning.

2. THE THEORETICAL BACKGROUND

Scientists identify the following approaches to application of IT in the educational process: inquiry-based approach, project-based learning, blended learning, flipped learning, mobile learning, game-based learning, collaborative learning, self-directed learning (fig. 1).

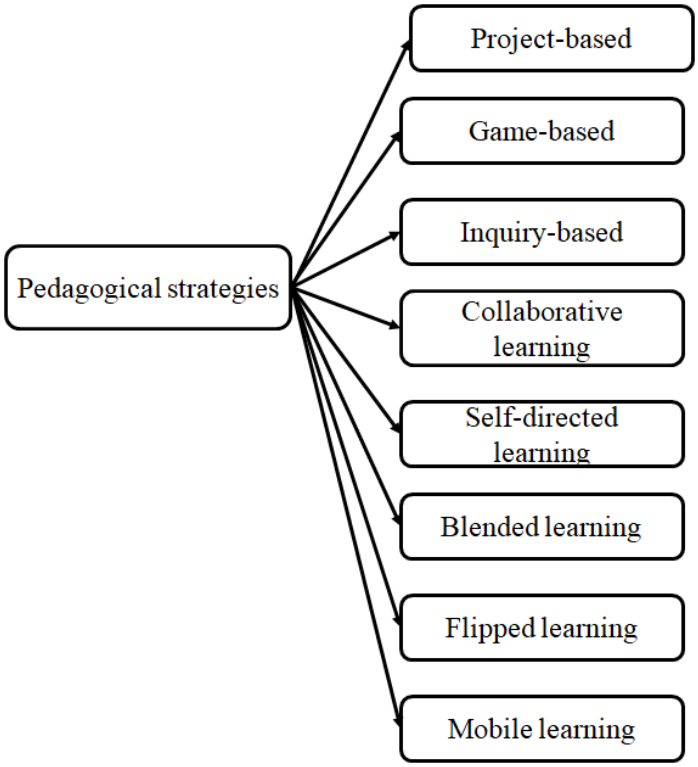

Fig. 1. Classification of pedagogical strategies

The inquiry-based approach in learning process means that students have the opportunity to discover something new while learning, offer explanations of the phenomena studied, develop concepts and build processes, check the progress of their work (assess) and evaluate its results (evaluate) on the basis of the received data [10]. In addition, inquiry-based learning is the learning process where students are at center of this process and take the lead in their own learning [11].

The project-based learning takes students through all the steps of scientific research: ask a question, develop a hypothesis, plan how to test this hypothesis, collect data, analyse the results and share it with peers [10].

Many researchers focus on the application of game-based pedagogical strategies to improve students' acquisition of foreign language knowledge [6] [8] [12] [13] [14].

S. Kim et al. define game-based approach as a set of steps to solve an obstacle that takes the characteristics of game-related elements [12]. IT-based games, the main purpose of which is not entertainment but learning, are examples of how IT can bring added value to the educational field, as they can entertain users during learning, particularly during foreign language learning, where it is necessary to immerse the student in special language environment and specific culture of native speakers [13] [14].

The blended learning (hybrid learning) is a teaching approch that integrates ICT with traditional classroom activities, giving students more flexibility to customize their learning experiences [10].

The flipped learning is a teaching approch that allows teachers to prioritise active learning tasks during class time by assigning students lecture materials and presentations to be viewed at home or outside of class [15].

The mobile learning is learning across multiple contexts, through social and content interactions, using personal electronic devices [16]. It is a form of distance education, that allows students to use a a mobile device based educational technology at their convenience.

Mobile technologies give the possibility to implement new forms of organization of education, which involve the interaction of subjects of education with each other not only during the lesson, but also outside it. Instant delivery of educational material helps to increase the student's work productivity. The use of mobile devices and a large amount of interactive educational material activates students' educational and cognitive activities. Compactness, small dimensions and wireless access to the educational environment enable students to be in the "online learning" mode almost constantly and regardless of location [17].

Self-directed learning is very interesting and important because it is a type of learning in which the conceptualization, design, conduct and evaluation of a learning project are directed by the learner. This does not mean that self-directed learning is highly individualized learning always conducted in isolation. Learners can work in self-directed ways while being engaged in a group-learning setting (method), provided that this is a choice they have made believing it to be conducive to their learning efforts [18].

These pedagogical strategies can be combined, especially when using the project method together with immersive technologies (augmented and virtual reality).

3. RESEARCH METHODS

To achieve the purpose of our study and also to clarify the problem of utilization of immersive technologies for the Japanese language teaching and learning together with traditional pedagogical strategies, we used the following methods: systematic and comparative analysis of pedagogical, psychological, philosophical, sociological works, methodological and specialized literature; analysis of the pedagogical experience of usage of immersive technologies at the Education and Research Institute of Philology of Taras Shevchenko National University of Kyiv; synthesis and generalization to formulate the main points of the study; interpretation of the research results by student survey and analysis of results in students' projects.

The research hypothesis is based on the assumption that teaching the Japanese language will be effective if the following pedagogical strategies are implemented together with application of ITs: inquiry-based approach, problem-based learning, blended learning, flipped learning, mobile learning, self-directed learning, collaborative learning, game-based learning.

4. THE RESULTS AND DISCUSSION

We offered several educational projects to Philology students of the 3rd year of study (38 students participated in the projects), namely: «Teaching the Japanese language to elementary school students with the help of ICT», «Students for schoolchildren: the linguistic and cultural aspect of the Japanese language with the help of ICT», «Lexicology of the Japanese language for those acquiring the professional competence of translators at JLPT 4-5 level (Official Worldwide Japanese-Language Proficiency Test) with the help of ITs», «Game world for mastering Japanese Kanji Characters and lexicology». The projects had the goal of creating a collection of educational materials for teaching Japanese to students at different levels of education and for students studying particularly difficult grammatical constructions of the Japanese language, such as complex verbs, alongside stylistics and cultural aspects of the Japanese language, which they had to reflect in their project results and, in particular, master ICT for teaching and translating Japanese, as well as creating their didactic materials.

Students were set in groups according to project topics. They were especially interested in the projects «Students for schoolchildren: the linguistic and cultural aspect of the Japanese

language with the help of ICT» (12 students) and «Game world for learning Japanese Kanji Characters and Lexicology» (11 students).

The other project topics were less popular among students:

«Teaching the Japanese language to elementary school students with the help of ICT» (6 students), «Lexicology of the Japanese language for those acquiring the professional competence of translators at JLPT 4-5 level (Official Worldwide Japanese-Language Proficiency Test) with the help of ITs» (5 students). Some students declined to participate in the proposed projects and suggested that they would evaluate some off-the-shelf augmented and virtual reality applications (e.g. Triplens, Mondly Japanese) regarding translation from Japanese to Ukrainian and vice versa (4 students).

We showed students the options for using such ITs for different levels of Japanese language learning (Japanese language learning levels are available at https://www.jlpt.jp/) as:

- ITs for various specialist areas: BioDigital Human 3D anatomy, 3D Anatomy Learning – Atlas, GeoGebraAR, Planets AR, Google Earth AR and VR;
- ITs for language learning: Easy Japanese news, Triplens, ARTranslate, Mondly;
- games for language learning: “Learn Japanese with Ling”, “YuSpeak: Learn Japanese & Korean”, “Duolingo”;
- Platforms for creating web projects with AR elements, such as BlippAR, Metaverse and Google ARCore, and with VR, such as CoSpaces.

The implementation of the educational project and the students' performance of tasks includes the following stages: introduction and explanation of the project’s objectives by teachers, discussion of goals of the projects to be performed by the students in class (performance time - 30 minutes); students' work in breakout groups to foster their discussion of project topics (execution time - 30 minutes); execution of projects by students including creation of a final presentation of project results (implementation time - one week, out-of-class students’ activity); presentation of project results by students (execution time - 45 minutes); discussion of project results in class and evaluation (execution time - 45 minutes).

The students were offered a plan of work on the project, which they could edit at will, namely: abstract, purpose, tools that will be used, which questions have to be addressed, how long it will take to complete the tasks, conclusions, presentation of results according to the following questions: why I chose this tool, what are the features of this tool, how to use it, a personal example, advantages and disadvantages of this tool, how to use my product to teach others.

For example, we would like to present an explanation of students' choice of the CoSpace tool to create a virtual learning environment where a student can learn Japanese, namely, the linguistic-cultural aspect, through taking a test:

«It is a program in which you can create a virtual situation and also test students’ knowledge of the Japanese language, it is more suitable for students at the initial language proficiency level, as it is difficult to work with complex Kanji characters; it offers a library of scenes and objects, including 3D; to start working, you need to click on the selected object; it is important that it is compatible with Scratch, because it allows you to independently write the algorithm of actions in a virtual environment; you can record your voiceover of the text or download such voiceover from the Internet».

Students made two stories: «strategies of polite forms of the Japanese language, addressing an older person with a honorific form (*sonkeigo*) or with a depreciative form (*kenjougo*); addressing form for a pet in standard polite Japanese language (*teineigo*)» (Fig. 2), «choosing the correct Japanese Kanji character» (Fig. 3).

Fig. 2. A scene where addressing form for a pet is displayed

Students attempted to teach others on the strategies of polite forms of the Japanese language, using the test where one had to choose the correct variant of the polite form of addressing a pet, in the project in Figure 2.

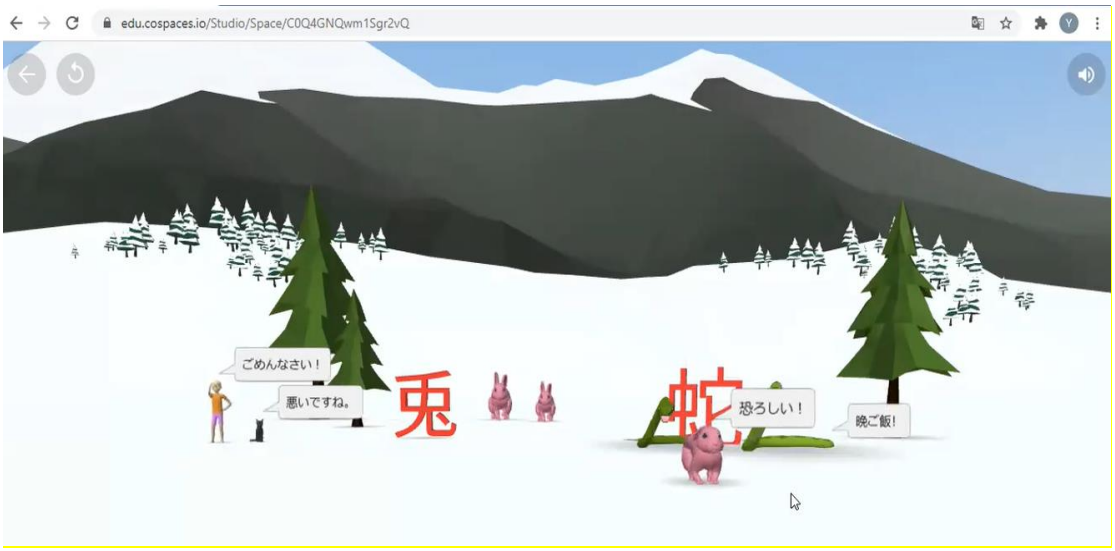

Fig. 3. A student project scene where the user should choose the correct Kanji character

Students proposed an interesting game scenario, namely (fig. 3): The wrong choice of Japanese Kanji Character will lead to choosing a snake (蛇) instead of a hare（兎） (Japanese Kanji Characters have common strokes or radicals, the task was to distinguish similar ones)

Students also chose the Metaverse to create examples of augmented reality. In this application, students created multiple-choice tests and explained Kanji characters and words accompanied by animation and sound (fig. 4).

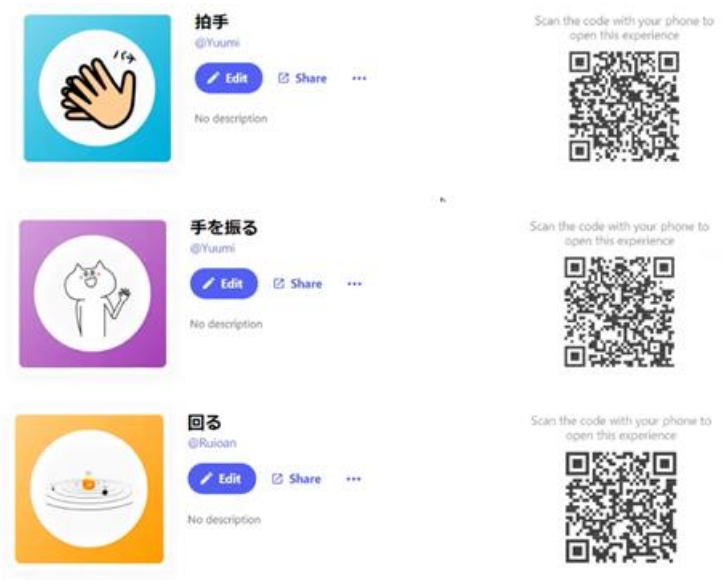

Fig. 4. Implementation of non-verbal communication methods through an augmented reality application – an example that was created by a student with the application "Metaverse"

Students explained the choice of this tool by the fact that it is easy to use, can be used in a Smartphone, and the examples made in it can be reproduced at any time, regardless of the user's location. In addition, in the Metaverse application, you can create a test with free answers, a photo gallery, a task during which you should create a selfie, a virtual museum.

We would also like to mention the project that was created by students with the help of VisualStudio and Unity, namely, a game in which it was necessary to choose the correct Kanji character at the first level, at the next level – the correct expressions. When choosing the wrong answer option, the hero was returning to the beginning of the game (fig. 5).

Fig. 5. Screenshot from a game created by a student in VisualStudio and Unity

Figure 5 shows an excerpt of the game created by students for their project, the purpose of which was to teach how to read Kanji characters correctly, namely: we see the Japanese

Kanji character (国民) which means “Citizenship” together with its hiragana version こくしん and こくみん – a student has to match correct answer （こくみん）with correct reading.

We surveyed students (38 students took part in the survey) about their attitude towards the use of ITs, considering various pedagogical aspects to improve the quality of the Japanese language learning. We proposed a list of statements and the following options for the students to choose from - «Strongly disagree» (SD), «Disagree» (D), «Not sure» (NS), «Agree» (A), «Strongly agree» (SA):

1. AR improves access to learning materials for the Japanese language learning (students' answers were meant to help to find out the effectiveness of mobile learning)
2. AR is not an obstacle for me to find material for the Japanese language learning (students' answers were meant to help to find out the effectiveness of mobile learning)
3. Immersive technologies increase my effectiveness in creating self-made education products and improve the Japanese language skills (students' answers were meant to help to find out the effectiveness of inquiry-based approach)
4. Immersive technologies are not a burden for me, as they are effective at improving my Japanese language skills and help me solve difficult tasks (students' answers were meant to help to find out the effectiveness of inquiry-based approach)
5. VR tools create environments for communication in Japanese without barriers (students' answers were meant to help to find out the effectiveness of collaborative learning)
6. Immersive technologies do not allow me to be open to communication (students' answers were meant to help to find out the effectiveness of collaborative learning)
7. Immersive technologies do not seem to help me to increase my engagement in learning of foreign languages, including oriental languages (students' answers were meant to help to find out the effectiveness of self-directed learning)
8. Immersive technologies help me to save time doing my homework (students' answers were meant to help to find out the effectiveness of self-directed learning)
9. Immersive technologies help me to develop myself as a researcher (students' answers were meant to help to find out the effectiveness of project-based learning)
10. Participation in an educational project with ITs does not seem to help me learn the linguistic and cultural features of the Japanese language (students' answers were meant to help to find out the effectiveness of project-based learning)
11. I prefer to learn Japanese in the traditional way, only in the classroom without the use of ICT (students' answers were meant to help to find out the effectiveness of blended learning)
12. The combination of immersive technology and group discussion, even online, helps me to improve my Japanese language (students' answers were meant to help to find out the effectiveness of blended learning)
13. Creating personal learning products using immersive technologies helped me learn the complex constructions and *Kanji* characters of the Japanese language (students' answers were meant to help to find out the effectiveness of flipped learning)
14. Individual work on the creation of an educational product using immersive technologies and its presentation in the classroom distracts me from learning the Japanese language (students' answers were meant to help to find out the effectiveness of flipped learning)
15. I like to learn the Japanese language through games based on AR and VR (students' answers were meant to help to find out the effectiveness of game-based approach)

16. Language games based on AR and VR distract me from learning the Japanese language (students' answers were meant to help to find out the effectiveness of game-based approach).

Table 1

The results of students' survey on their their attitude to pedagogical strategies with the use AR and VR in the Japanese language learning process (% (number of students who responded))

Statement	SD	D	NS	A	SA
AR improves access to learning materials for the Japanese language learning			28,9% (11)	71% (27)	
AR is not an obstacle for me to find material for the Japanese language learning				100%	
Immersive technologies increase my effectiveness in creating self-made education products and improve the Japanese language skills			36,8% (14)	63% (24)	
Immersive technologies are not a burden for me, as they are effective at improving my Japanese language skills and help me solve difficult tasks		23,6% (9)	21% (8)	55% (21)	
VR tools create environments for communication in Japanese without barriers		36,8% (14)	63% (24)		
Immersive technologies do not allow me to be open to communication		47% (18)	13% (5)	39% (15)	
Immersive technologies do not seem to help me to increase my engagement in learning of foreign languages, including oriental languages	5% (2)	44,7% (17)	10,5% (4)	39% (15)	
Immersive technologies help me to save time doing my homework		55,3% (21)		44,7% (17)	
Immersive technologies help me to develop myself as a researcher			15,79% (6)	84% (32)	
Participation in the educational project with ITs does not seem to help me learn the linguistic and cultural features of the Japanese language		94,7% (36)		5% (2)	
I prefer to learn Japanese in the traditional way, only in the classroom without the use of ICT		81,58% (31)		18% (7)	
The combination of immersive technology and group discussion, even online, helps me to improve my Japanese language			26% (10)	73,3% (28)	
Creating personal learning products using immersive technologies helped me learn the complex constructions and *Kanji* characters of the Japanese language			26% (10)	73,3% (28)	
Individual work on the creation of an educational product using immersive technologies and its presentation in the classroom distracts me from learning the Japanese language		73,3% (28)		26% (10)	
I like to learn Japanese language through games based on AR and VR			34% (13)	65,79% (25)	
Language games based on AR and VR distract me from learning the Japanese language		73,3% (28)	18% (7)	7,89% (3)	

We noticed that «Strongly agree» was not selected by students for any of the statements, which indicates that students are not sufficiently convinced that immersive technologies and selected strategies are important for their language learning. We would like to draw your attention to the fact that augmented reality technologies and, accordingly, mobile learning are

of particular importance for students in learning Japanese (71% (27) of the students agreed that AR improves access to learning materials for the Japanese language learning). In addition, students are interested in project-based learning using immersive technologies (84% (32) of the students agreed that immersive technologies help them to develop as a researcher; 94,7% (36) of the students disagreed with the statement "Participation in the educational project with ITs does not seem to help me learn the linguistic and cultural features of the Japanese language".

Interviewing the students at the seminar where they presented their results from the educational projects also showed that they are interested in learning the Japanese language with the help of information and communication technologies, but immersive technologies for them are quite new technologies, which they should learn and need to have free time for that. At the same time, they noted that the pedagogical strategies in combination with the immersive technologies introduced to them by us develop their research skills and provide opportunities to creatively solve tasks.

4. CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

The use of immersive technologies is quite effective with such pedagogical strategies as inquiry-based approach, project-based learning, blended learning, flipped learning, mobile learning, self-directed learning, collaborative learning, and game-based learning.

Pedagogical strategies for the formation and development of students' research skills, linguistic competence in learning Japanese, memorization of complex language constructions and especially Japanese Kanji characters, which are difficult for students, are of particular importance. The main obstacle in the use of augmented and virtual reality for students is the lack of user experience.

The analysis of scientific literature and our own experience of using the main pedagogical strategies with virtual and augmented reality tools made it possible to determine the following ways of using immersive technologies for teaching undergraduate students majoring in Oriental languages, in particular the Japanese language: 1) a combination of pedagogical strategies and immersive technologies in the form of educational projects for students; 2) the use of special applications of augmented and virtual reality for students to create their own examples to teach others complex Japanese language constructions (for example, polite forms of addressing people of different social status, reading Japanese Kanji characters, etc.); 3) creation by students of personal instructions for the use and explanation of augmented and virtual reality tools when learning the Japanese language.

The prospects of our further research are the active implementation of augmented and virtual reality in the teaching of Japanese language students using basic pedagogical strategies, especially inquiry-based approach, project-based learning, as they allow simultaneous combined application of all other pedagogical strategies indicated by us in the study.

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ПЕДАГОГІЧНІ СТРАТЕГІЇ З ІММЕРСИВНИМИ ТЕХНОЛОГІЯМИ ДЛЯ ПРОЦЕСІВ ВИКЛАДАННЯ ТА НАВЧАННЯ ЯПОНСЬКОЇ МОВИ

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Анотація. У статті розглядається проблема педагогічних стратегій із застосуванням імерсивних технологій у навчанні та викладанні іноземних мов, зокрема японської мови. Авторами визначені та обґрунтовані основні педагогічні стратегії з використанням імерсивних технологій (підхід на основі запитів, проєктне навчання, змішане навчання, перевернуте навчання, мобільне навчання, ігрове навчання, спільне навчання, самостійне навчання). Проведено дослідження щодо особливостей використання студентами 3 курсу ННІФ Київського національного університету імені Тараса Шевченка імерсивних технологій при виконанні ними навчальних проєктів. Проаналізовано ставлення студентів до педагогічних стратегій із використанням доповненої та віртуальної реальностей. Визначено, що студентам важко застосовувати ці технології, оскільки у них недостатньо досвіду щодо їх використання у вивченні мови, але ці інструменти значно допомагають у формуванні і розвитку дослідницьких навичок, цифрової компетентності, у вдосконаленні їх умінь використовувати інформаційно-комунікаційні технології при вивченні японської мови, сприяють поліпшенню їх міжкультурної комунікації. У подальших наших дослідженнях планується активне впровадження доповненої і віртуальної реальностей у навчання студентів японської мови через використання основних педагогічних стратегій, особливо через підхід на основі запитів та проєктне навчання, при використанні яких можна враховувати інші педагогічні стратегії: змішане навчання, перевернуте навчання, мобільне навчання, ігрове навчання, спільне навчання, самостійне навчання.

Ключові слова: імерсивні технології; доповнена реальність; віртуальна реальність; вивчення японської мови; педагогічні стратегії; міжкультурна комунікація.

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