Implementation of virtual reality in foreign language teaching

Впровадження віртуальної реальності у викладання іноземної мови

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Abstract

The article highlights the main features of the virtual educational environment, the advantages and formats of using virtual reality in learning a foreign language. The purpose of the article is to study the role and possibilities of virtual reality as a necessary component in learning a foreign language.

The methodological concept is aimed at shaping the role and capabilities of virtual reality as a necessary component in foreign language learning.

The results of the study show the importance of the main modules of the multimedia virtual environment for learning cultures and languages in institutions of higher education; the technology of writing a pedagogical script for a computerized course is proposed for the design of distance courses for learning a foreign language, the construction of a high-quality virtual language environment, and the methods of using virtual reality tools are presented.

Анотація

У статті виокремлено основні риси віртуального освітнього середовища, переваги та формати застосування застосування віртуальної реальності при вивченні іноземної мови. Метою статті є вивчення ролі і можливості віртуальної реальності як необхідного компонента у вивченні іноземної мови.

Методична концепція спрямована на формування ролі та можливостей віртуальної реальності як необхідної складової у навчанні іноземної мови.

У результатах дослідження показано важливість основних модулів мультимедійного віртуального середовища вивчення культур та мов у закладах вищої освіти; запропоновано технологію написання педагогічного сценарію комп'ютеризованого курсу для проектування дистанційних курсів вивчення іноземної мови, побудови якісного віртуального мовного середовища та представлено способи

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The experimental work was devoted to the study of the role and possibilities of virtual reality as a necessary component in learning a foreign language; the degree of change in the memory of students of higher education, operational characteristics of thinking, perception in the process of using virtual reality educational programs. The change of attention, which is closely related to the functioning of cognitive processes, was also studied.

Keywords: virtual reality, learning a foreign language, virtual language environment, training of specialists, cognitive processes.

застосування інструментарію віртуальної реальності.
Експериментальна робота була присвячена вивченню ролі та можливостей віртуальної реальності як необхідного компоненту при вивченні іноземної мови; ступеня зміни пам'яті здобувачів вищої освіти, операційних характеристик мислення, сприйняття в процесі використання освітніх програм віртуальної реальності. Досліджувалась і зміна уваги, яка тісно пов'язана з функціонуванням пізнавальних процесів.

Ключові слова: віртуальна реальність, вивчення іноземної мови, віртуальне мовне середовище, підготовка фахівців, пізнавальні процеси.

Introduction

All over the world, in the educational process of higher educational institutions, various technologies are widely implemented, which play a very important role in the educational space, and provide interactive learning in educational institutions, because full involvement in the educational process stimulates the student's brain activity and, with the help of observing the most realistic picture, increases success in the acquisition of knowledge and motivation of students of higher education. Such technologies include augmented reality and virtual reality. The application of virtual reality technologies in the field of education considered a special information environment and simulated by a computer, is a new innovative approach to the presentation and learning of educational material in which all objects are presented in three dimensions (Khmil et al., 2023).

A distinctive feature of such an innovative environment is experiencing the effect of the presence of a person and changing images in real-time. Virtual reality simulates exposure and reactions to this exposure. Recently, virtual reality technologies have evolved from being dubious and promising to be widely implemented and used. Today, virtual reality technologies in education in general and foreign language learning, in particular, are the development of cognitive skills, an additional opportunity to use innovations, and increasing interest in the discipline (Trach, 2017).

The search for new approaches to the organization of the educational process of a higher school involves a rethinking of the very content of education, that is, the introduction of new educational constructs into vocational

training, the introduction into the educational process of higher education institutions of effective pedagogical technologies, methods and forms of learning when learning a foreign language (Dashko & Dubytska, 2019).

But, despite the importance of virtual reality technology, and the need to spread this technology as one of the experimental methods of learning in the educational process, we note that there are very few real studies of virtual reality in pedagogy. This can be explained only by the recent use of virtual reality in the educational processes of institutions of higher education and when learning a foreign language, the high material costs of these studies, the complexity of implementation in the educational process, and not only in a specific country but in the world as a whole.

Therefore, we are interested in the role and possibilities of virtual reality as a necessary component in learning a foreign language.

Advantages of virtual reality:

- Enhance learning opportunities (virtual reality provides a unique and immersive learning experience by immersing users in a virtual environment. Such an immersive approach improves memorization and understanding of complex concepts during memorization).
- Realistic training simulations (provides a safe and controlled environment for conducting various training simulations. This allows to reduce the number of errors and increase the efficiency of work in professions with high requirements).

Disadvantages of virtual reality:

- High cost (the equipment needed to work with virtual reality is quite expensive, in particular, we are talking about a headset, powerful computers and additional accessories).
- Health problems (long-term use of virtual reality leads to various health problems, such as motion sickness, eye strain, dizziness. In addition, isolation in a virtual reality environment can negatively affect mental health and social interaction.
- Lack of social interaction (virtual reality often involves individual interaction, which limits the possibilities of social connections in the real world).

The possibilities of virtual reality help in learning foreign languages. After all, the most effective method of learning a language is the method of immersion in life situations and conversations. A feature of such programs is changing images in real time and experiencing the effect of presence. You can communicate with virtual ones characters in different places and situations. Thus, not only communication skills are improved, but language barriers are also overcome. The process of learning foreign languages is significantly accelerated.

The following main questions are considered in the article: the features of the virtual educational environment; the main advantages of using virtual reality when learning a foreign language; formats of using virtual reality in learning a foreign language; the best virtual reality projects for learning a foreign language; content and construction of a virtual language environment for learning a foreign language; the main modules of the multimedia virtual environment for the study of cultures and languages in institutions of higher education; the technology of writing a pedagogical script for a computerized course for designing distance courses for learning a foreign language and building a high-quality virtual language environment; virtual reality as a necessary component in learning a foreign language; ways of using virtual reality tools; the key criteria for training specialists; show the experimental study of the role and possibilities of virtual reality as a necessary component in learning a foreign language; the degree of change in the memory of students of higher education, operational characteristics of thinking, perception in the process of using virtual reality educational programs.

Literature Review

Various investigations have addressed the use of virtual and augmented reality in education, including its implementation in the educational process of higher education institutions. Thus, L. Taranhul & S. Romaniuk (2022) studied the role and experience of using augmented reality technologies in the educational process of higher education institutions, revealed its limitations and advantages (the HP Reveal platform) associated with its use in the educational space, which allows improving teaching methods and visualizing educational information. A. Torianyk (2019) also considered the disadvantages and advantages of augmented and virtual reality technologies in education. The scientist proved that virtual programs cannot completely replace traditional teaching in higher education institutions. However, they can make learning easier, especially when learning the most difficult topics, including languages. Yu. Trach (2017) also summarized the experience of studying the possibilities of using virtual reality technologies in the educational process. The disadvantages and advantages of using these technologies in education are given. N. Khmil, T. Halytska-Didukh, & Q. Wang (2023) showed the relevance, prospects, and expediency of using virtual reality technologies, analyzed their possibilities in the educational process, and also showed the disadvantages and advantages of using these technologies in education. D. Yefimov (2021), the purpose and functions of this technology are formulated by Yu. Matviienko (2021). The scientist analyzed applications implemented with AR technology, which are expedient to use in the educational process of a higher school. This is the problem, the use of virtual and augmented reality in the context of mixed learning was dealt with by V. Kovalenko, M. Marienko, & A. Sukhikh (2021), which are defined as separate applications that can significantly increase the effectiveness of such educational process.

Osadchyi et al., (2023). the necessity of using augmented and virtual reality technologies to improve the organization of group cooperation and teamwork, the education process and increase the motivation of education seekers has been proven.

L. Dashko, & O. Dubytska (2019) revealed the essence of virtual reality when learning a foreign language, and analyzed the positive consequences, types, and ways of using virtual reality technology both in independent work and in the classroom. The means and methods of

virtual reality as an informational method of assimilation and presentation of material are shown, and high-tech didactic tools are given that allow to increase the effectiveness of foreign language learning. M. Skurativska, & S. Popadiuk (2019) specified concepts: "virtual language environment" and "virtual educational environment"; modern tools for building a virtual educational environment during foreign language learning, software products in a higher education institution are defined.

As a result of the analysis of the latest research and publications, it was found that there are very few real studies of virtual reality in pedagogy.

The researchers proved the relevance, prospects, and expediency of using virtual reality technologies, showed the advantages and disadvantages of using these technologies in education, analyzed their possibilities in the educational process; analyzed the most common applications based on virtual reality technologies; showed the main stages of the introduction of technologies into the educational process of a higher school.

The presented research significantly enriches the theory and practice of virtual education, but the authors of these works reduce the application of virtual education technologies to the use of electronic textbooks and test shells, less often multimedia materials, and in some cases – computer virtual simulators and simulators. At the same time, many issues related to the widespread introduction of virtual reality technologies in various spheres of life in modern society, including in education, remain unexplored. One of these issues is the need to generalize the accumulated experience of studying the possibilities of using virtual reality technologies in the educational process of a higher school in general and as a necessary component in learning a foreign language, in particular.

The implementation of virtual reality in foreign language teaching is a new aspect in the professional training of specialists. It should be noted that the traditional approaches used for training foreign language specialists in the context of activities teachers are not always appropriate. However, despite this, the implementation of virtual reality in foreign language teaching has not received enough attention. In addition, the relevance of the identified problem is enhanced by a number of contradictions between:

– public order for the training of specialists capable of innovative activities in the educational process, and the insufficient focus of higher education institutions on solving this problem;
– the objective need to train specialists for the implementation of virtual reality and its insufficiently effective implementation in practice in higher education institutions;
– the need to form the readiness of specialists for the implementation of virtual reality and the lack of development of content-methodical support for such training.

Therefore, the objective need to solve the specified problem, its insufficient theoretical and practical development, the need to overcome the specified contradictions determined the choice of the topic of the article.

The aim of the study. To study the role and possibilities of virtual reality as a necessary component in learning a foreign language; the degree of change in higher education students' memory, operational characteristics of thinking, and perception in the process of using virtual reality educational programs; to investigate the change of attention, which is closely related to the functioning of cognitive processes.

Methodology

To achieve the defined goal of the research, a set of research methods was applied:

Theoretical: **abstraction** (consists in the mental selection of essential, most essential features, relationships, sides of the object. With its help, an ideal image of reality is formed); **induction and deduction** (define such a mental construction in which a conclusion about some element of a set is made on the basis of knowledge of the general properties of the entire set); **eneralization** (displaying the main results in a general position); with the help of the **interpretation method**, the studied materials were summarized and conclusions were formulated. An analysis of the scientific and pedagogical literature was carried out on the following topics: 1) Virtual reality and learning foreign languages. 2) Memory, thinking, perception and attention in students of higher educational institutions. 3) Research methodologies in education.

Empirical methods. The following data collection methods were used: 1) Visual short-term memory test. 2) Questionnaire for assessment of critical thinking. 3) Likert scale for

measuring perception of virtual environment. 4) Tasks on sustained attention and divided attention.

When determining the sample of subjects, the general specificity of the subject of the study was taken into account. The total sample size is 32 subjects. When forming the sample, the criteria of meaningfulness, representativeness, and equivalence were taken into account. The sample was formed by random selection using the technical procedure for calculating the selection step.

The reliability and validity of the obtained results, the objectivity of their assessment was ensured by the methodological soundness of the initial positions and the qualitative mechanism for evaluating the quality under study, the use of a complex of complementary research methods, and the involvement of a group of respondents from a higher educational institution in the analysis of its results.

The leading idea of the research is based on identifying the features of virtual reality as a necessary component in learning a foreign language; the degree of change in the memory of students of higher education, operational characteristics of thinking, perception in the process of using educational programs of virtual reality, which ensure effective, purposeful formation of professional competence of future specialists in the created innovative educational environment.

Methodological concept of purposeful formation of the role and possibilities of virtual reality as a necessary component in learning a foreign language; the degree of change in the memory of students of higher education, operational characteristics of thinking, perception in the process of using virtual reality educational programs takes into account the main innovative approaches to the study of the given problem: competence-based, systemic, personally oriented, axiological, activity-based, reflective, humanistic.

The experimental work was devoted to the study of the role and possibilities of virtual reality as a necessary component in learning a foreign language; the degree of change in the memory of students of higher education, operational characteristics of thinking, and perception in the process of using virtual reality educational programs. The change of attention, which is closely related to the functioning of cognitive processes, was also studied.

The purpose of the experimental study. To determine the degree of influence of virtual reality training programs on short-term visual memory.

Research methods and procedure.

To establish the degree of influence of virtual reality educational programs on short-term visual memory, we have built a system for evaluating the levels of the degree of influence of virtual reality educational programs on short-term visual memory.

The experiment was carried out in three stages: preparatory, main, and final.

At the preparatory stage, research tasks were determined, a goal was set, an experiment plan was developed, control and experimental groups were selected, their homogeneity was checked, and methods of measurement and processing of results were identified.

The experiment was conducted at the main stage. At the final stage, the results of the experiment were confirmed, their reliability was analyzed, conclusions were drawn about the study of the role and possibilities of virtual reality as a necessary component in learning a foreign language, and the impact of virtual reality educational programs on short-term visual memory.

To assess the homogeneity of control and experimental data, statistical processing was carried out using MS Excel and SPSS (Statistical Package for Social Science) programs.

We distinguished the levels of impact of virtual reality educational programs on students' short-term visual memory: low, medium, and high.

The conducted experimental study shows that training programs in a virtual environment, which contribute to the formation of students' cognitive motivation, are an effective means of forming thinking, perception, attention, memory, and, in general, education of students of higher education.

Results and discussion

Content of the terminological apparatus of gamification.

The main features of the virtual educational environment. In our time, quickly training specialists in various specialties with the help of

virtual reality means creating an ideal learning environment, where mandatory acceptance of the virtual model by those seeking higher education will lead to high-quality and competitive education. M. Smulson (2015) noted that: "Today, the Internet has already gone beyond human control and has become a new reality – virtual".

Nowadays, an integral component of the educational environment is the virtual component, which is a component of learning in the work of study groups, in face-to-face lectures, in the independent work of a student of higher education, in an exam, in the library, etc. (Škerlak et al., 2014).

The system of "virtual reality" was created by replacing the infrared camera with computer images in 1966 by the American computer scientist A. Sutherland, and in 1989 the computer scientist Jaron Lanier introduced the term "virtual reality". In the future, smartphones will become one of the main "accelerators" of virtual reality. Thanks to their use, virtual reality has become widely used not only in such areas as robot management, entertainment, health care, computer games, shops, museums, the automotive industry, military affairs, etc. but also in education (Trach, 2017).

J. Lipeikiene, (2003) defines a virtual educational environment as software that is hosted on a specific server and created to manage various aspects of education: access to resources, monitoring of student performance and evaluation, and course management mechanism.

Let's name the main features of the virtual educational environment:

– password-based access control;
– use of the main types of physical media: virtual reality, animation, digital audio, text, 2D and 3D graphics, digital video;
– creation of well-prepared course material (course material can be updated, changed, supplemented) and its management;
– links to important information on the Internet, digital libraries, etc.;
– communication tools – messengers, e-mail, announcements, presentations, discussions within the environment;
– automatic glossaries, search systems, indexes;
– tools for self-assessment, and automatic assessment;
– connection to the software necessary for training;

– personal space for students of higher education to exchange materials and store them;
– statistical information about the educational process for a teacher of a higher school, monitoring the success of students of higher education, and systematization of their grades.

The virtual educational environment can be called a specific open dynamic space for the implementation of the educational process, an online learning environment, and a necessary component of learning a foreign language (Skurativska & Popadiuk, 2019).

The main advantages of using virtual reality when learning a foreign language.

There are five main advantages of using virtual reality technologies when learning a foreign language:

– visibility (using 3D graphics, it is possible to show educational processes in detail. Virtual reality is able not only to provide information about the phenomenon itself but to demonstrate it with any degree of detail);
– focusing (the virtual world will allow you to fully focus on the material, surround the viewer from all sides for 360 degrees, and prevent you from being distracted by external stimuli);
– involvement (virtual reality allows you to influence the course of the experiment, change scenarios, and solve tasks in an accessible and playful form. During a virtual lesson, you can go on a trip to the countries of the world, and see the world of the past through the eyes of a historical character);
– safety (you can immerse a student of higher education in any situation);
– virtual classes (feeling of your presence in the drawn world, first-person view). This makes it possible to conduct classes in virtual reality (Trach, 2017). Such technologies use very widely computer cognitive graphics, the main task of which is to stimulate creative thinking and cognitive mechanisms, and not just to interpret knowledge.

The use of virtual reality technologies in learning a foreign language implies that the educational space should be rebuilt accordingly.

Formats of using virtual reality in learning a foreign language.

Currently, the following formats of using virtual reality in foreign language learning are distinguished:

– face-to-face learning – transfer of empirical material through virtual reality when learning a foreign language. Virtual technologies in semantic learning offer interesting opportunities for the transfer of empirical material. With this approach, the classic format of the educational space is not distorted, since the lesson is supplemented with an n-minute immersion. The virtual lesson can be divided into several scenes, which are turned on at the right moments. The lecture remains a structural element of the lesson. This makes it possible to consolidate the material, attract students of higher education to the educational space, modernize classes, and visually illustrate;

– distance learning – group classes with social interaction and the effect of presence. With distance learning, the student of higher education is in any part of the world and listens to the language from its native speaker as well as the teacher. Each of them is personally present in the virtual audience, and has his own avatar: he listens to lectures, interacts, and performs group tasks. And therefore, feels the presence, and eliminates the boundaries that exist in education through video conferences;

– mixed education – the opportunity to see what is happening, to be remotely in the classroom while learning a foreign language, to interact with real students of higher education and teachers (the student of higher education can do this remotely if there are circumstances that prevent him from attending classes with the possibility of broadcasting in the mode real-time);

– self-education – any of the developed educational courses can be adapted for independent study. The classes themselves can be stored in online stores (Steam, Google Play Market, Oculus Store, App Store) so that everyone has the opportunity to master or repeat the material independently when learning a foreign language (Trach, 2017).

The best virtual reality projects for learning a foreign language.

Among the best virtual reality projects for learning a foreign language, we should note the following:

– LABSTER – interactive, developed in partnership with leading universities, 3D project – MIT (Massachusetts Institute of Technology), Stanford, and Harvard. Students of higher education can remotely, with a full set of equipment, carry out experiments in scientific laboratories;

– EXPEDITIONS PIONEER PROGRAM – the program allows students of higher education to visit places "where not every person can go." The virtual platform is designed for high-quality learning of a foreign language, within which teachers conduct virtual excursions to strange and exotic places on our planet (the platform has more than 100 educational excursions);

– THE APOLLO 11 VIRTUAL REALITY EXPERIENCE – a loud game that offers to go to the moon on a spaceship. Together with the crew of the historic ship, the authors recreated all the details of the flight, launch, and landing with high accuracy, adding to the study of a foreign language fantastic space landscapes, a documentary chronicle, fantastic music;

– LECTURE VR – the project includes a series of lectures with visual visualization, which can be attended as part of a group and individually as a supplement to the class;

– Colosseum VR – offers higher education students to move to Ancient Rome, to visit the Colosseum, the Palatine Hill, the Temple of Venus, the Arch of Constantine, the center of gladiator fights, the Colossus of Nero, etc.;

– Mezo VR – allows you to see history, trace the stages in the history of civilization, hear an ancient language;

– zSpace – glasses designed for students of higher education function according to the 3D example: who at this moment in the glasses sees the image, students can control the device with the help of an interactive pen (Trach, 2017).

The main modules of the multimedia virtual environment for the study of cultures and languages in institutions of higher education.

In institutions of higher education, the main modules of the multimedia virtual environment

for learning cultures and languages are effective and necessary:

– virtual video library – educational video films, films of the countries whose language is being studied;
– virtual media library for learning a foreign language with multimedia courses;
– virtual, with authentic audio materials, sound library;
– satellite television network;
– computer testing system;
– virtual reference system – encyclopedias, dictionaries, grammar guides;
– virtual library of electronic portfolios of higher education applicants;
– a virtual library of electronic manuals (Skurativska & Popadiuk, 2019).

The technology of writing a pedagogical script for a computerized course for designing distance courses for learning a foreign language and building a high-quality virtual language environment.

The application of the technology of writing a pedagogical script for a computerized course to design distance courses for learning a foreign language and building a virtual language environment is of great importance in language learning.

This technology can be presented as follows:

1 stage – exploratory – definition of the purpose and tasks of the course, didactic analysis, analysis of content information from the discipline, methodical analysis, selection of the form of presentation of educational material, selection of techniques and methods of teaching, selection of criteria for mentoring;
2nd stage – main – selection of practical tasks (tests), structuring of reference and educational materials, creation of a bank of game situations, formation of a glossary, development of a testing system (monitoring, current, final, intermediate control, etc.), approbation of the scenario, making changes as necessary;
3rd stage – final – development of instructions for higher education applicants and methodical recommendations for teachers (Skurativska & Popadiuk, 2019).

A modern student of higher education, as well as a teacher of a foreign language, must acquire ICT competence to effectively use the technology of the virtual educational environment in practical activities. The priority is the need to introduce certain information and communication

technologies into the educational process, and only then the transition to permanent systematic work with Internet resources (Yatsenko, 2013).

Virtual reality as a necessary component in learning a foreign language.

In the field of foreign language training of the future specialist, mobile learning is extremely important and widespread, i.e. learning using tablets and smartphones. I. Zachepa (2017) emphasizes the need for additional (electronic) products "aimed at more intensive use of mobile devices, i.e. more exercises are offered for independent (autonomous) processing of information for the main types of activities (listening, reading, speaking, writing) and for active communication in a group instead of traditional formalized grammar exercises". Nowadays, when learning a foreign language, preference is also given to the use of manuals that are authentic and provide the presence of online tests, Internet resources, and foreign language exercises (Biletska et al., 2021).

One of the simplest methods of group learning using virtual technologies as necessary components in learning a foreign language is the creation of a group page using the WikiWiki system of rapid hypertext interaction, in the space of a virtual educational environment. This can be a site or blog with links to applications and files. This page is available for all higher education students of the group and all students can discuss, comment, discuss, and leave entries on the forum.

It is effective to use services-systems of social publications and bookmarks (BibSonomy, CiteULike, etc.) to organize the storage of own links to various sources.

SlideBoom and SlideShare services can be used to share and store presentations; and for high-quality work, it is worth working with PDF files – Scribd web service, etc.

Through the online media journal – the Flipboard application, a foreign language teacher can systematize selected various thematic articles (Skurativska & Popadiuk, 2019).

Using virtual reality glasses and helmets as a necessary component in learning a foreign language, students of higher education can immerse themselves in the atmosphere of a curriculum, game, stimulator, etc. Nowadays, the most promising educational direction of using virtual programs is the reproduction of the

customs of the country whose language is studied, and directly of its language in the socio-cultural reality, which allows the student of higher education to become a participant in the cultural, linguistic, communicative, socio-cultural situation.

Virtual reality tools provide an opportunity for interactive interaction and have a significant impact on audiovisual perception, which contributes to more effective assimilation of language material. The user feels the reality of the environment precisely with such a virtual presence and in an interactive situation it allows: them to explain, learn to react, and fulfill a conventional role. It helps a lot in consolidating new skills and learning language situations (for example, on the topics: "In the store", "In the theater", "USA", "Great Britain", "Types of transport", "Travel", etc.) – that is, when the developed educational scenario, the reality of which is impossible or difficult to create in the classroom.

Ways of using virtual reality tools.

Education in higher education includes the following methods of using virtual reality tools: conducting seminars, laboratories, lectures, practical classes, organizing educational excursions, etc. Such technology can be used in the process of self-education.

The use of virtual reality as a necessary component in learning a foreign language, as a toolkit in the educational space of a higher school, would allow diversifying the educational process and changing the methods of acquiring knowledge. Modeling the situation when learning a foreign language allows you to explore and study its various options. You can study, consider, and analyze in detail various options proposed by the student himself, and intuitively choose the optimal solution in a specific situation (when various conditions and parameters are changed) or random ones proposed by the education system. A student of higher education can also give a forecast of the expected result by changing and complicating them, check it.

Currently, such content for teaching a foreign language, created in the Google Expeditions application, is sufficient. It is enough to cover the traditional topics that are part of the foreign language curriculum: history, geography, sports, travel, art, etc. We can conclude that since the materials are already available and developed in English, then in the language education system foreign language teachers will be among the first

to actively use virtual reality technology (Dashko & Dubytska, 2019).

There are already a significant number of different applications in learning a foreign language for virtual reality, which are constantly increasing. More than 300 companies operate on the European market and have been implementing their technologies in the education sector for a long time (Samsung, Oculus, Sony, HTC, Microsoft). Many of them for learning a foreign language offer services for the development of unique effective programs for institutions of higher education and are engaged in the creation of educational content. Therefore, any institution of higher education can order a special program for learning a foreign language and successfully use it in its educational space (Polishchuk et al., 2022).

Virtual reality as a necessary component in learning a foreign language is the result and process of interaction between students of higher education and teachers, which takes place in a virtual educational space, which cannot exist outside of the communication of participants in the educational process of a higher school (Agüero Corzo & Dávila Morán, 2023). However, virtual educational programs cannot completely replace traditional teaching in higher education institutions, as they only simulate objects in the digital space and reality. However, their wide use in the educational space of higher education is appropriate when studying the most complex topics in learning a foreign language and provides additional opportunities for in-depth learning of the material (Babiuk, 2022).

It is important to note that Esperanza Glasses 3D VR virtual reality glasses are available in university education. With their help, it is possible to immerse yourself in the virtual world with the help of a smartphone. For this it is necessary (Matviienko, 2021):

1) download one of the applications from the Apple Store or Google Play using the keywords VR 3D 360;
2) place a smartphone in a special slot of the glasses;
3) launch the application;
4) insert a smartphone into the helmet.

Virtual reality technologies are a necessary component in learning a foreign language but are not yet widely used. Let's name the following reasons:

– insufficient number of specialists in the field of education who would be prepared to use VR technology;
– unpreparedness for restructuring the education system;
– a high price for VR technology equipment;
– the need to reformat educational plans;
– insufficient number of educational programs (Osadchyi et al., 2023).

The key criteria for training specialists are based on virtual reality.

Modern digital technologies based on virtual reality when learning a foreign language determine the key criteria for the training of specialists, including (Khmelnytska, 2023):

– increasing the concentration of attention of higher education seekers,
– focus on the practical component of the educational space of the higher school,
– facilitating the search for information when learning a foreign language,
– increasing the motivation of those seeking higher education,
– increasing the productivity of the educational process,
– ensuring the interactivity of the educational space,
– monitoring of educational achievements,
– promoting the development of creative abilities, spatial abilities, and memory (Khmil et al., 2023).

Experimental study of the role and possibilities of virtual reality as a necessary component in learning a foreign language; the degree of change in the memory of students of higher education, operational characteristics of thinking, perception in the process of using virtual reality educational programs.

The experimental work was devoted to the study of the role and possibilities of virtual reality as a necessary component in learning a foreign language; the degree of change in the memory of students of higher education, operational characteristics of thinking, and perception in the process of using virtual reality educational programs. The change of attention, which is closely related to the functioning of cognitive processes, was also studied.

When choosing the results, the role and possibilities of virtual reality as a necessary component in learning a foreign language were investigated; degree of change in memory,

operational characteristics of thinking, perception of students of higher education in the process of using educational programs of virtual reality; the change of attention, which is closely related to the functioning of cognitive processes, was investigated.

The purpose of the experimental study. To determine the degree of influence of virtual reality training programs on short-term visual memory.

Research methods and procedure.

To establish the degree of influence of virtual reality educational programs on short-term visual memory, we have built a system for evaluating the levels of the degree of influence of virtual reality educational programs on short-term visual memory.

The experiment was carried out in three stages: preparatory, main, and final.

At the preparatory stage, research tasks were determined, a goal was set, an experiment plan was developed, control and experimental groups were selected, their homogeneity was checked, and methods of measurement and processing of results were identified.

The experiment was conducted at the main stage. At the final stage, the results of the experiment were confirmed, their reliability was analyzed, conclusions were drawn about the study of the role and possibilities of virtual reality as a necessary component in learning a foreign language, and the impact of virtual reality educational programs on short-term visual memory.

To assess the homogeneity of control and experimental data, statistical processing was carried out using MS Excel and SPSS (Statistical Package for Social Science) programs.

We distinguished the levels of impact of virtual reality educational programs on students' short-term visual memory: low, medium, and high.

Let's take a closer look at all the levels.

Let's list the signs of a low level of influence of virtual reality training programs on short-term visual memory: lack of participation in activities, motivation to study theory; lack of ability to perform the simplest tasks; fragmentary assimilation of knowledge; inability to control,

plan one's own work; not being able to conduct introspection.

The formation of the impact of virtual reality training programs on short-term visual memory at an average level: insufficient motivation to study the material; the ability to perform elementary tasks by example; partial assimilation of knowledge, and professional work skills; partial ability to control one's own work, plan its results and conduct self-analysis.

Future specialists with a high level of influence of virtual reality training programs on short-term visual memory show the following indicators: the presence of constant motivation to study the material; high independence in the systematic assimilation of knowledge; the ability to control one's own work, systematically plan, constantly look for ways to improve, show responsibility, carry out introspection.

To study the role and possibilities of virtual reality as a necessary component in learning a foreign language, and the impact of virtual reality educational programs on short-term visual memory, respondents were offered tests for memorizing numerical series, 12 numbers, and 12 images.

After viewing the virtual reality training program for short-term visual memory, the respondents solved the tests again.

Sample: intellectually developed students of higher education or respondents who received higher education (age of respondents 20 – 50 years; number of respondents – 25 people).

Research results: we observe a significant positive impact (at a high level of significance, reliable p – 0.001 ...) that virtual reality training programs have on the volume of 86 short-term visual memory (1.96, this is the difference in mean values). A smaller effect is observed on the symbolic memorization of numbers (0.08, this is the difference in mean values), and on the short-term memory of the respondents (test: length of series, the difference in mean values was 0.28).

We will reveal the obtained results regarding other cognitive processes.

When studying changes in cognitive functions during an experimental study, classical procedures were used for their diagnosis – excluding concepts and establishing similarities with the concept (study of generalizations), proofreading – the Burdon-Anfimov test

(measurement of stability and concentration of attention), a modified Schulte digital table (study of switching attention), etc.

Research results. Virtual reality training programs had a significant effect on increasing observability (difference of mean values, 1.4 – difference test); concentration and stability of attention (Bourdon-Anfimov test); on generalization and ability to classify (test of identifying common concepts (establish similarity with the proposed concept sets of five words – 20 sets), exclusion of concepts (sets of 5 words – exclude redundant – 17 sets) (1.8 – difference of mean values). There was a general decrease in indicators for only one of the studied parameters – this (modified Schulte digital table) attention switching: the average time to solve tasks, remaining in the range of the average level of switching, increased to 158.2 seconds from 136.4 seconds. Only one cognitive was used style among personal indicators – field-dependence-field-independence Working in virtual reality training programs (the average solution time decreased to 18.7 seconds from 42.3 seconds) leads to a significant increase in field-independence.

The sample consisted of – 32 respondents.

We claim that the negative impact of virtual reality educational programs is fragmentary and insignificant. In general, virtual reality has a positive stimulating effect on the cognitive processes of the student of higher education and some personal characteristics of a person.

The conducted experimental study shows that training programs in a virtual environment, which contribute to the formation of students' cognitive motivation, are an effective means of forming thinking, perception, attention, memory, and, in general, education of students of higher education.

A comprehensive analysis of the theoretical and methodological foundations of the implementation of virtual reality in foreign language teaching prompts the justification of promising ways to improve virtual reality in foreign language teaching in educational institutions in Ukraine. The recommendations interpreted in the course of scientific research make it possible to use advanced ideas regarding the introduction of virtual reality in foreign language teaching in the conditions of the Ukrainian educational environment.

Recommendations for educational institutions of Ukraine - improving the content of educational programs; improvement of processes of motivation of teachers to independent assimilation of professional knowledge; introduction of innovative forms, methods and technologies of education into the educational process of secondary education institutions; introduction of virtual reality subjects into the curriculum of educational institutions. Inclusion in the work of educational institutions: forms of dissemination of pedagogical innovations, creative groups on virtual reality, etc.

Recommendations for teachers: systematic professional self-development and self-improvement in the conditions of the study of high-ideal achievements in the field of studying virtual reality, as well as the application of new modern technologies and teaching methods; application of innovative methods and information and communication technologies, forms of training organization in professional and teaching practice.

Recommendations for students: encouraging students to research work, to participate in various projects and trainings aimed at familiarization with virtual reality.

Conclusions

We considered the role and possibilities of virtual reality as a necessary component in learning a foreign language, highlighted the main features of the virtual educational environment, and the advantages and formats of using virtual reality in learning a foreign language. The results of our research showed the need for additional theoretical work on understanding virtual reality as a didactic system.

Therefore, we proposed the best practically-oriented virtual reality projects, revealing the content and construction of a virtual language learning environment; the technology of writing a pedagogical scenario of a computerized course for the design of remote foreign language courses is proposed.

The results of the study show the importance of the main modules of the multimedia virtual environment for learning cultures and languages in institutions of higher education; the technology of writing a pedagogical script for a computerized course for designing distance courses for learning a foreign language, building a high-quality virtual

language environment is proposed, and methods of using virtual reality tools are presented; the features of the virtual educational environment are defined; the main advantages of using virtual reality while learning a foreign language, formats of using virtual reality in learning a foreign language; the main criteria for the training of specialists are outlined.

In general, the experimental study confirmed that virtual reality significantly affects the educational space of society and the cognitive processes of the individual. This is typical for children, young people, adults, and the elderly. In the article, we offered recommendations (for educational institutions, teachers, students) that lead to the justification of promising ways to improve virtual reality in foreign language teaching in educational institutions in Ukraine.

We see prospects for further research in the development of practically oriented virtual reality projects.

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