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DOI: https://doi.org/10.46502/issn.1856-7576/2025.19.03.15

Cómo citar:
Liakhovska, Y., Postoiuk, N., Rokosovyk, N., Malyk, Y., & Hrytsiv, V. (2025). Advancing foreign language education through technological innovations in higher education. *Revista Eduweb*, *19*(3), 236-255. https://doi.org/10.46502/issn.1856-7576/2025.19.03.15

Advancing foreign language education through technological innovations in higher education

Impulso a la enseñanza de lenguas extranjeras mediante innovaciones tecnológicas en la educación superior

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Recibido: 23/07/25
Aceptado: 22/09/25

Abstract

The content of technological innovations in the study of foreign languages is discussed. The subject and procedural aspects of these innovations are outlined. The main categories of innovations are examined.

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Specific principles effective for students in higher education are presented. The key innovative types of educational activities in higher education that are most advanced and well-received by students studying foreign languages are highlighted. The importance of multimedia technologies, distance learning, electronic tools, computers, and web-based education is demonstrated. An experimental study was conducted to verify the effectiveness of a developed system for applying technological innovations in foreign language learning among higher education students. From the initial findings, it was concluded that the implementation of technological innovations in foreign language studies is currently insufficient. Therefore, a system and pedagogical conditions were developed to prepare students to effectively use technological innovations in foreign language learning, both in higher education and future professional activities. It has been shown that the implemented system for applying technological innovations in foreign language learning is effective and has positively influenced the readiness of students to utilize these innovations in their future careers.

Keywords: technological innovations, foreign language learning, students of higher education institutions, Internet technologies, electronic resources.

Resumen

Se analiza el contenido de las innovaciones tecnológicas en el estudio de lenguas extranjeras. Se describen los aspectos temáticos y procedimentales de estas innovaciones. Se examinan las principales categorías de innovaciones. Se presentan los principios específicos eficaces para los estudiantes de educación superior. Se destacan las actividades educativas innovadoras clave en educación superior, más avanzadas y con mayor aceptación entre los estudiantes de lenguas extranjeras. Se demuestra la importancia de las tecnologías multimedia, la educación a distancia, las herramientas electrónicas, las computadoras y la educación en línea. Se realizó un estudio experimental para verificar la eficacia de un sistema desarrollado para la aplicación de innovaciones tecnológicas en el aprendizaje de lenguas extranjeras entre estudiantes de educación superior. A partir de los hallazgos iniciales, se concluyó que la implementación de innovaciones tecnológicas en el estudio de lenguas extranjeras es actualmente insuficiente. Por lo tanto, se desarrolló un sistema y las condiciones pedagógicas para preparar a los estudiantes para utilizar eficazmente las innovaciones tecnológicas en el aprendizaje de lenguas extranjeras, tanto en la educación superior como en sus futuras actividades profesionales. Se ha demostrado que el sistema implementado para la aplicación de innovaciones tecnológicas en el aprendizaje de lenguas extranjeras es eficaz y ha influido positivamente en la preparación de los estudiantes para utilizar estas innovaciones en sus futuras carreras profesionales.

Palabras clave: innovaciones tecnológicas, aprendizaje de lenguas extranjeras, estudiantes de instituciones de educación superior, tecnologías de internet, recursos electrónicos.

Introduction

The modern development of society is characterized by the rapid development of technological innovations, integration and globalization processes, the growth of openness and accessibility of information resources and communication tools, a broad basis is being created for the formation of an updated modern paradigm of education, which ensures the formation of a competent, highly professional specialist of the new generation, capable of critically reflecting on the latest achievements and traditional achievements of science, working creatively in a team, and generating new ideas.

The content of the Council of Europe Recommendations on Language Education Policy provides new requirements for the training of a future specialist, to the level of his qualification, which combines professional and pedagogical skills, a high level of language competence, and readiness to use technological innovations in the conditions of modern education.

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The content of education is enriched with new skills, knowledge, abilities, creative solutions to professional problems, information, and an emphasis on individualization of learning. In recent years, special attention has been paid to the need to intensify work on the introduction of technological innovations.

In the context of rapid development of society, humanization, and humanization, a rethinking of cultural and value orientations is taking place in higher education around the world, which in the training of specialists in various specialties significantly actualizes the need for specialists to communicate pedagogically using a foreign language and cross-cultural communication in the innovative and technological space, to implement professional and effective activities of teachers, specialists in foreign language courses, linguistic centers, coordinators of online educational platforms, etc.

The organization of the educational process of students with the use of technological innovations will contribute to the formation of basic competencies and readiness in their future professional activities to apply modern technological innovations.

Literature Review

The analysis of the research of scientists proves that the problem of studying foreign languages by students of higher education institutions does not have a single direction of research on the ways of using technological innovations, but is represented by several directions. The goal of each direction is the practical mastery of a foreign language by applicants in the educational space. It is for this reason that when studying foreign languages, higher education institutions introduce innovative technologies and methods of teaching students.

The improvement of foreign language education through technological innovations in higher education institutions is described by Rincón-Ussa et al. (2020). The experience of scientists was implemented in the training of future teachers and consisted of the implementation of modern teaching strategies mediated by various ICT tools. These strategies are aimed at the use of future teachers of the bachelor's program in various academic spaces in foreign languages. The basis for the implementation of innovative methods was the study of the value of ICT-mediated learning strategies, the integration of ICT in the process of methodological and pedagogical innovations.

To study the current state of English language teaching and the improvement of foreign language education through technological innovations in educational institutions in Chile, Celis Orellana & Bustos Ibarra (2025) proposed a relevant and fundamental innovative study to promote the progress of the practice of teaching English as a foreign language, aimed at the development of linguistic skills. The study proposed by the scientists was conducted in accordance with the PRISMA-ScR framework, with the aim of implementing a communicative approach, reflecting research on teaching English in Chile in a school context and developing students' linguistic skills.

In the modern educational space, it has been proven that mobile devices are increasingly used as tools to promote quality learning. Therefore, Pineda Castillo & Yedra (2024) conducted an important study on the qualitative learning of a second language for reading comprehension by students in English and Spanish. In order to improve foreign language education through technological innovations, an evaluation of reading comprehension programs and innovations in this field was made, and this is necessary in order to respond to the needs of transformation in language teaching. The authors presented 25 mobile applications for learning English, using the iPAC program rubric, which identifies authenticity, personalization, and collaboration - pedagogical features of mobile learning. The researchers developed recommendations for improving foreign language education through technological innovations. Scientists have dedicated their research to improving language education through technological innovations. The researchers created a website to support the learning process and used mixed methods with a consistent research design. The learning dynamics were facilitated by the well-adapted interface and user-friendly nature of the website.

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This digital space, according to the website, has been used for similar purposes in other professional settings.

The aim of researchers such as Casimiro Perlaza & Vega Rosas (2025) is to characterize and determine the adaptability of future teachers of English as a foreign language to technological innovations by analyzing key aspects of their profile during pedagogical practice. Technological innovations encompass innovative achievements that can challenge established practices and methods. The use of these technologies in the context of English as a Foreign Language (EFL) contributes to meeting the needs of students by enabling future teachers to adapt to the digital environment through the use and learning of new digital tools. The study ensured the development of digital pedagogical competencies of students by developing and implementing an innovative model of education for teachers of English as a Foreign Language, developed by researchers, in higher education.

Learning a foreign language in a non-native context is a complex and difficult task. Philominraj et al. (2021) examined innovative language learning strategies (LLS) used by students in the study of Spanish as a Foreign Language (SFL) at two leading universities in India. The researchers discussed and analyzed the general learning strategies within a descriptive framework using a mixed method.

Today, there is a need for teaching to integrate new tools, such as mobile technologies, to support students in learning some elements of the English language learning. Vásconez Miranda et al. (2020) showed ways to integrate innovative tools into curricula, which can help improve students' skills in foreign languages, strengthen positive attitudes and motivation towards the teaching and learning process, and find ways to achieve pedagogical innovations based on augmented reality (AR).

The implementation of technological innovations in foreign language learning by students of higher education institutions contributes to the formation of language competence in students. The researchers' research emphasizes the importance of improving foreign language education for the process of individualizing education through technological innovations.

Objective of the research. Improving the study of foreign languages by students of higher education institutions through the use of technological innovations.

Methodology

To achieve the set goal, the following research methods were used: **theoretical** – generalization and specification of theoretical provisions, analysis, abstraction for the purpose of analysis in the study of a scientific thesaurus; synthesis, systematization of sources for the purpose of formulating basic concepts of technological innovations, forming a scientific apparatus; comparative analysis, generalization and structuring of the use of technological innovations in future professional activities; comprehensive analysis of the forms, methods, and content of technological innovations in the study of foreign languages by students of higher education institutions; **empirical** – conversations, questionnaires, observations, testing, self-assessment; pedagogical experiment to determine the levels of students' readiness to use technological innovations in future professional activities; **methods of mathematical statistics**: a method of statistical data processing based on the Pearson criterion for analyzing the results of experimental work (quantitative and qualitative).

In order to experiment, we formulated a goal, put forward a hypothesis, determined the content of the main stages; students were divided into experimental and control groups; during the pilot survey, analysis and processing of actual material were performed.

The purpose of the experiment was to verify the effectiveness of the system for applying technological innovations in the study of foreign languages by students of higher education institutions.

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The hypothesis of the study was the assumption that the level of readiness of students to apply technological innovations in the study of foreign languages will increase in future professional activities if, in the process of learning foreign languages, a learning system using technological innovations is implemented by students under certain conditions:

The hypothesis of the study was tested by conducting a pedagogical experiment. The experiment was conducted during 2023–2025. 164 students of socionomic specialties participated in the study.

Research and experimental work were carried out in several stages. The purpose of each stage involved the performance of tasks for the purpose of further processing the data obtained. To diagnose the formation of students' readiness in future professional activities to use technological innovations, criteria, indicators, and levels were determined.

Based on the conducted assessment section, conclusions were drawn about the insufficiency of the implementation of technological innovations in the study of foreign languages. The main purpose of the questionnaire was to determine the attitude of students to the implementation of technological innovations in higher education institutions in the study of foreign languages for their further implementation in future professional activities. Therefore, pedagogical conditions were developed for the formation of students' readiness to use technological innovations in the study of foreign languages by students in higher education and in future professional activities. A theoretically grounded system for the application of technological innovations in the study of foreign languages by students in higher education was practically implemented in the educational process of the EG.

In the process of research, we compared the results of the ascertaining stage and the control stage of the experiment, which was evidence of the validity of the hypothesis put forward by us. Qualitative analysis and quantitative analysis of the data obtained by diagnostic means during purposeful, long-term monitoring of the process and results of students' learning allow us to say that the developed system of application of technological innovations in the study of foreign languages by students in higher education is effective.

Using the EXEL program, based on the non-parametric Pearson criterion – chi-square (χ^2), statistical processing of the obtained data was carried out.

According to the Pearson chi-square criterion, the results of the statistical assessment of the formation of students' readiness to apply technological innovations in the study of foreign languages in future professional activities after the experiment allow us to state the prevalence (at $p \leq 0.05$) of the indicators $\chi^2_p > \chi^2_{cr}$, which is the basis for rejecting the null hypothesis. Therefore, hypothesis H1 is an alternative. It confirms the statistical significance of the results obtained.

The results of the study were statistically significant. The conducted study proves that the implementation of the system of application of technological innovations in the study of foreign languages by students in higher education in the EG is effective, and it was this that positively influenced the level of readiness of EG students to apply technological innovations in the study of foreign languages in their future professional activities.

Results and Discussion

The content of technological innovations in foreign language learning. The subject and procedural side of innovations. The main groups of innovations.

The active use of technological innovations, the introduction of digital technologies in the educational space, mobile devices, and the use of wireless networks have affected the methods and forms of organizing learning in the 21st century. A gradual transformation of learning technologies is taking place today, which were previously based on information and knowledge, the basis of which is the exchange of experience

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and knowledge, and active interaction. As a result of the innovation process, scientific knowledge is transformed into technological innovations that meet the new requirements of society through professional study of foreign languages by students in higher education institutions and include a sequential series of actions that involve the creation and implementation of innovations in the practice of higher education (Robles et al., 2021). Among the criteria, technological innovations distinguish the manageability and purposefulness of changes in the study of foreign languages, which replenish the educational environment, enabling students of higher education institutions to achieve a certain result. As a form of managed development, technological innovation is implemented purposefully by a specific subject. In this case, innovations are created from the outside when studying foreign languages by students, and can also appear and be implemented within a certain system of higher education institutions (Vargas-Caicedo & Guaman-Tumbaco, 2020).

A certain result involves the implementation of any process, which is the goal of the activities of higher education students.

So, in technological innovation in the study of foreign languages, two sides are dialectically combined:

- Something new is created and introduced − the subject side.
- The method of achieving the necessary result − the procedural side (Alvarez Martinez et al., 2025).

Therefore, the application of technological innovations acts as a system of relations, actions, and elements in the study of foreign languages by students of higher education institutions that provides the necessary results.

Depending on the subject content of innovations, the organic combination of the above-mentioned aspects distinguishes organizational and managerial, socio-economic, technical, and technological complex innovations (Giralt et al., 2023).

Let us name the main (by scope of implementation) groups of innovations:

- Technological innovations related to the design of educational facilities, the educational process of higher education, educational management, and are manifested in educational technology.
- Innovations in the content of education (manuals, textbooks, curricula, etc.).
- By the method of implementation: planned, spontaneous, systematic, random (Feng, 2024).

Let us name the main, by the nature of origin, groups of innovations: internal and external innovations.

Let us name the main − taking into account the “depth” and “breadth” of innovative transformations − groups of innovations: combinatorial, modification (local), radical (basic, global, fundamental).

Let us name the main groups of innovations in terms of their relevance: “classical”, temporary, and long-term innovations (Andrade-Velásquez & Fonseca-Mora, 2021). The highest level of innovation in the study of foreign languages is inherent in “classical” innovations, because it is here that all the criteria of relevance are manifested. And as a result, their self-development is constantly manifested.

Specific principles that are effective in teaching foreign languages to students of higher education institutions.

The effectiveness of studying foreign languages by students of higher education institutions is ensured by adhering to a number of specific principles. Let us reveal the content of the main ones.

The principle of continuity of education ensures self-education throughout life and contributes to the formation of abilities and professional competence.

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The principle of innovation generation ensures the organization of joint activities of students in studying foreign languages for the creative implementation of ideas and the generation of innovations.

The principle of communication in the educational process of higher education ensures the organization of the process of studying foreign languages by students, which takes into account the peculiarities of real situations of communication of students in higher education institutions.

The principle of dynamism ensures the dynamic alignment of the goals, forms, means, and methods of learning by students of higher education institutions in accordance with the intensification of the learning process.

The principle of adaptability contributes to the implementation of purposeful interaction of students of higher education institutions, taking into account the didactic capabilities of technological innovations and their individual capabilities in learning foreign languages.

The principle of facilitation motivates students and stimulates them to use technological innovations in teaching foreign languages in the process of student interaction, which is professionally oriented.

The principle of self-regulation determines the influence of technological innovations on adjusting the process of studying foreign languages by students, in accordance with changes in the conditions of functioning in the educational space, with the use of technological innovations.

The principle of cooperation affects the implementation of the organization of subject-subject interaction with an orientation on the formation of students' readiness in future professional activity for the skillful use of technological innovations (Simões et al., 2024).

The main innovative types of educational activities in a higher education institution that are most progressive and are perceived by students when studying foreign languages are. Multimedia technologies, distance, electronic, computer, web-based learning, etc.

An important role in the successful implementation of the strategy for the application of technological innovations by students of higher education institutions when studying foreign languages is played by innovative transformations that encourage students to test, search, and stimulate the appropriate update of educational policy, and introduce innovations into the professional process of training specialists. Great competition among higher education institutions contributes to the activation of the search for new forms, technologies, and methods of organizing the educational process in higher education and requires compliance with high criteria of scientific and pedagogical personnel (Zhou, 2024).

The process of applying technological innovations when studying foreign languages has its own specifics regarding the selection of technological innovations in classes. Thus, the University of Michigan offers criteria for their selection, the main of which is the organization of types of educational activities of students when studying foreign languages, taking into account their interests (Viáfara & Largo, 2018).

Preference is given to such types of educational activities in a higher education institution that are perceived by students when studying foreign languages with interest, please them from learning; preference is given to creative tasks; organization of discourse and intercultural interaction; formation of creative problem-solving skills, orientation on the development of students' critical thinking, independent decision-making; orientation, in accordance with the learning goal, on increasing students' motivation; concentration on well-known facts, main ideas, and not on interesting or episodic details; connection with current events and organization of types of educational activities taking into account real situations (Zhang & Dong, 2024).

The specificity of studying foreign languages is that students get acquainted with theoretical knowledge about the language in the process of studying it, and master practical language skills. In the process of

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studying other disciplines, unlike a foreign language, students will receive information that exists outside their consciousness. When studying foreign languages, higher education students do not receive direct knowledge about the surrounding reality. They study the means of expressing and creating thoughts about things, events, certain phenomena, etc. When studying foreign languages, students receive information about ethical rules, customs and traditions, cultural and historical heritage, and the art of the peoples whose language is being studied. In the process of communicative activity, students solve intellectual and social problems. This is the specificity of studying foreign languages (Alcaraz Mármol, 2024).

The solution to the problem of forming students' readiness in their future professional activities to use technological innovations when studying foreign languages in higher education institutions is facilitated by the introduction of multimedia technologies, the defining and main advantage of which is the possibility of approaching the real conditions of the educational environment, which are close in intensity and authenticity to foreign language communication. When studying foreign languages, among the advantages of using multimedia technologies in higher education is the possibility of implementing an individual approach to learning, which is relevant for a contingent of students with different psychophysiological characteristics, a heterogeneous degree of motivation for learning, a different level of foreign language knowledge, and a different degree of formation of skills and abilities (Pacheco et al., 2022).

The modern Internet provides significant opportunities for creating an innovative foreign language learning environment, for applying technological innovations in it, and provides access for students and teachers to foreign language resources. The modern Internet changes the nature of learning, is a reference and information system, and gives educational activities the features of flexibility, independence, and interactivity. Learning can be carried out anywhere, and allows taking into account the individual abilities of students and the level of knowledge in time and space without restrictions (Huang et al., 2024).

Similar to multimedia technologies, learning foreign languages is also web-learning, distance learning, computer-based, electronic, etc., which are characterized by similarity of types of educational activities, high mobility, independence, and individuality of forms of work. It should be noted that in its pure form, the use of such technological innovations cannot ensure high learning outcomes for students, because in the conditions of modern education they require students to be highly motivated, self-organizing, capable of self-education, self-control, etc., and require the teacher to systematically and timely monitor each stage of each student's educational activity (Lütge, 2023).

Methodology and organization of experimental work.

To conduct the experiment, we set a goal, proposed a hypothesis, defined the main stages, and divided students into experimental and control groups. During the pilot survey, we analyzed and processed the actual material.

The purpose of the experiment was to verify the effectiveness of the system of application of technological innovations in the study of foreign languages by students of higher education institutions.

The hypothesis of the study was the assumption that the level of readiness of students to apply technological innovations in the study of foreign languages will increase in future professional activity if, in the process of learning foreign languages, a learning system using technological innovations is implemented by students under certain conditions:

- Motivation of students to use technological innovations in future professional activity.
- Organization of student interaction (professionally oriented) and creation of innovative educational and methodological support of the system.

The hypothesis of the study was tested by conducting a pedagogical experiment. The experiment was conducted during 2023–2025. 164 students of socionomic specialties participated in the study.

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Research and experimental work were carried out in several stages. The purpose of each stage involved the performance of tasks for the purpose of further processing the data obtained. Let us reveal the content of the main stages of the study.

At the first stage, the issues of the essence of technological innovations in the study of foreign languages by students of higher education institutions were studied, the initial principles of the study were clarified, the search and ascertaining parts of the experiment were carried out, the features of the use of technological innovations and opportunities for teaching a foreign language by students of higher education institutions in the conditions of modern education were determined.

The following activities were carried out in the ascertaining part of the experiment:

1. Studying the attitude of students of higher education institutions to the problem of implementing technological innovations in the process of teaching foreign languages.
2. Aligning the main factors of the study of the application of technological innovations in the study of foreign languages by students of higher education institutions, except for what was checked.
3. Diagnosing the formation of students' readiness, their levels of use of technological innovations in the study of foreign languages.

The main diagnostic tools at the ascertaining stage of the experiment were observation, survey, questionnaire, and testing methods.

At the second stage, an analysis of the source base (theoretical) was carried out on the problem of implementing technological innovations in higher education institutions in the study of foreign languages.

The positive experience of using innovative technologies in higher education institutions was generalized and systematized, and a thorough study of the following research problems was carried out.

To diagnose the formation of students' readiness in future professional activities to use technological innovations, the following criteria and indicators were determined:

- **Motivational** (attitude to technological innovations, their introduction into the educational process, the need for innovations in the process of teaching foreign languages, cognitive interest in the introduction of technological innovations in higher education).
- **Activity** (level of formation of knowledge about technological innovations in teaching foreign languages, level of initial achievements of students, level of formation of skills for implementing technological innovations in teaching foreign languages).
- **Reflective** (character of manifestation of students' personal and professional qualities in the process of implementing innovative technologies in teaching foreign languages, readiness for self-development, ability to reflect).

Three levels of formation of students' readiness for the introduction of technological innovations in higher education institutions in learning foreign languages and their further implementation in future professional activities were identified: high, medium, and low.

The third stage implemented the diagnostic and formative components of the experimental study and was characterized by the implementation of a substantiated system for introducing technological innovations in foreign language learning in higher education institutions for their further implementation in future professional activities and verification of its effectiveness.

Among the methods used in the third stage of the study were synthesis, analysis, comparison, model, generalization, deduction, and induction. Statistical analysis of the data was carried out using the non-parametric Pearson chi-square test.

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Based on the pilot study, conclusions were drawn. The main purpose of the survey was to determine the attitude of students to the introduction of technological innovations in foreign language learning in higher education institutions for their further implementation in future professional activities. The results of the survey indicate that students show a positive attitude towards the introduction of technological innovations in foreign language learning (77%); however, it should be noted that only a small number of students (23%) were familiar with their types and essence; los estudiantes que utilizar tecnologías innovadoras y profesionales (48%); the need for further improvement of innovative forms of work with students is discussed (67.5%) respondieron; they show incomplete readiness to use technological innovations in future professional activities (51%) respondiente; Students emphasize that the fragmented use of technological innovations in foreign language learning often gave positive results (59%).

Testing the system of application of technological innovations in foreign language learning by students in higher education.

Analysis and generalization of the pilot study data indicate a low level of students' readiness to apply technological innovations in the study of foreign languages, and their use at an intuitive level. We believe that it is possible to partially solve the outlined problem by creating an author's didactic system for the application of technological innovations in the study of foreign languages by students in higher education. The control group was studied according to the standard methodology. In the experimental group, a theoretically grounded author's didactic system for the application of technological innovations in the study of foreign languages by students in higher education was introduced.

To implement the specified components of the system, innovative measures were introduced aimed at stimulating students' interest in the practical significance of technological innovations in the study of foreign languages; manifestation of motives and emotions regarding the introduction of technological innovations in the study of foreign languages by students in higher education, in the introduction of innovative experience – the formation of the need for studying foreign languages; comparison of motives with the availability of innovative material and technical support for the implementation of technological innovations in the study of foreign languages by students in higher education (mediatization and informatization, technical equipment of special classrooms, etc.).

The use of web resources (Podcast, Wiki, Blog, Webquest, YouTube, Quislet, Padlet, etc.) was effective in the EG.

Pedagogical conditions for the formation of students' readiness to use technological innovations in the study of foreign languages by students in higher education and in future professional activities were determined: students' motivation in future professional activities to use technological innovations, organization of professional interaction aimed at students; creation of innovative support for the process of forming students' readiness to use technological innovations in the study of foreign languages in higher education and in future professional activities.

For the formation of students' readiness to use technological innovations in the study of foreign languages by students in higher education and in their future professional activities, the possibilities of using the resources of Internet technologies of the first and second generations (Web 1.0, Web 2.0), especially Web 2.0 in the system of training students with the use of technological innovations, were of significant importance. In the process of learning foreign languages, wide opportunities are provided by Internet resources of the first generation – these are websites and web pages, which can subsequently make changes to the site and are developed by qualified specialists. Internet resources of the second generation provide the opportunity to change the content for ordinary users. Wide opportunities for the use of electronic resources are opened by Web 2.0 for educational purposes in higher education: Wiki, Blog, Podcast, WebQuest, Flickr, YouTube, etc.

In the process of teaching a foreign language, among other Internet technologies of the second generation, it is worth highlighting web quests, which were used during the experimental study and motivated students

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to independent active learning, stimulated independent search for the formation of skills, necessary information in the Internet space, analyze, compare, find a solution to the problem and choose the most optimal option. Among the quest participants, the implementation of the Web quest technology provided intensive exchange of communication and information, contributed to the development of critical thinking of students, allowed higher education students to collect information and analyze it, systematize and generalize, which allowed students to creatively approach the solution of the tasks.

During the study, technological innovations were also used.

The capabilities of the 2.0Z service were used, taking into account the principles of creativity, flexibility, activation of learning, and clarity, which allowed us to introduce the methodology of working with a “word cloud”. The “clouds” were different in color, shape, and had a certain visual load, containing semantic information – separate vocabulary or text. Work with “clouds” was used to check the material from the home study.

One of the significant technological innovations that we introduced in the EG during the implementation of the components of the developed system for applying technological innovations in the study of foreign languages by students in higher education was the technology of communicative design. The essence of this technology allowed us to convey specific information to the interlocutor through the use of various visual means, while communicative interaction took place, both verbally and visually.

The introduction of technological innovations in the study of foreign languages during the training of future specialists contributed to the search and analysis of the necessary information, the formation of students' skills to identify problems and eliminate them, make alternative decisions, and, in the process of group and individual work, to choose the most optimal way to solve professional tasks.

The use of various types of portfolios played a prominent role in the EG to determine the ability of future specialists to reflect and their readiness for self-development throughout life.

Thus, the theoretically grounded system of applying technological innovations in the study of foreign languages by students in higher education was practically implemented in the educational process of the EG.

Analysis of the research results.

In the process of the study, we compared the results of the ascertaining stage and the control stage of the experiment, which was evidence of the validity of the hypothesis put forward by us. Qualitative analysis and quantitative analysis of the data obtained by diagnostic means during purposeful, long-term monitoring of the process and results of students' learning allow us to say that the developed system for the application of technological innovations in the study of foreign languages by students in higher education is effective.

To determine the levels of formation of students' readiness to use technological innovations in future professional and pedagogical activities, it was necessary to identify the dynamics of their development and assess the effectiveness of the theoretically grounded system.

The study at the ascertaining stage involved tracking the dynamics of the formation of students' readiness to use technological innovations in the study of foreign languages in higher education and in future professional activities according to the following indicators: attitude (when teaching foreign languages) to the introduction of technological innovations by students in higher education and in professional activities, cognitive interest, need for innovations. A survey was conducted for this purpose among EG and CG students in higher education institutions. The results of the study of students showed a low level of readiness to apply technological innovations in the study of foreign languages in higher education and in

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future professional activities. At the same time, no significant differences were found between the CG and EG:

- 77% of respondents, when studying foreign languages, showed a positive attitude towards the use of technological innovations in higher education and to the introduction of innovative technologies in future professional activities, but showed a low level of readiness to apply technological innovations, which is the case for the vast majority of respondents.
- 23% were familiar with the types, forms, and essence of the application of technological innovations, which was a small number of respondents.

The conducted survey (declarative cross-section) revealed problems with students' readiness to apply technological innovations in the study of foreign languages by students in higher education and in future professional activities. Most of the respondents are not sufficiently familiar with the forms, types, and essence of technological innovations in foreign language teaching, have no idea about the widespread use of innovations in foreign language learning, and do not clearly understand the concepts of “innovative activity” and “innovative competence”.

Using the EXEL program, based on the non-parametric Pearson chi-square test, statistical processing of the obtained data was carried out. To verify statistical significance during the study, the following assumptions were made according to the criteria we identified:

- **null (H0)**, which assumes that only random differences exist between the indicators;
- **alternative (H1)**, which was based on the fact that there are non-random differences between the indicators.

The value of the confidence probability of statistical conclusions, at the same time, was determined at the level of $p \leq 0.05$. We used this approach when checking all indicators of students' readiness to use technological innovations when studying foreign languages by students in higher education and in their future professional activities.

Analysis of the results of the survey, which provided a scale of up to three points from zero, confirmed in the EG and CG the respondents' need for technological innovations: in the CG, the indicator was 2.7 points; in the EG, the indicator was 2.8 points.

Analysis of the results of the survey, which provided a scale of up to three points from zero, confirmed in the EG and CG the desire to introduce technological innovations in their future professional activities: in the CG, the indicator was 2.4 points; in the EG, the indicator was 2.5 points.

Analysis of the results of the survey allowed us to identify favorable factors in the process of introducing technological innovations – the respondents had a positive attitude towards innovations in education. When scaling to three points − from zero, the following data were obtained: in the CG, the indicator was 2.7 points; in the EG, the indicator was 2.8 points.

Analysis of the results of the survey showed that the respondents had a desire to improve technological innovations and the ability to use them when learning foreign languages: in the CG, the indicator was 2.8 points; in the EG, the indicator was 2.9 points.

At the same time, at the beginning of the experiment, there was a vague idea of the features of organizing innovative activities and the essence of technological innovations in foreign language classes. When scaling to three points − from zero, the following data were obtained: in the CG, the indicator was 0.6 points; in the EG, the indicator was 0.8 points.

Observation and questionnaires of students in the process of organizing the educational process of higher education indicated their low level of innovative activity.

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This situation was predicted, since students were at the initial stage of preparation for future innovative activity. But after the experiment, we observed positive changes in all indicators according to the specified criteria in the EG, where the system of application of technological innovations in the study of foreign languages by students in higher education was implemented. The system of application of technological innovations in the study of foreign languages by students in higher education had a particular influence on the formation of the need for innovation, which was shown by the results of the student survey and the results of the EG of the first pedagogical practice.

The results of the formative stage of the experiment allowed us to identify positive dynamics in the formation of students' readiness to apply technological innovations in the study of foreign languages by students in higher education.

With the purposeful introduction of the components of the developed system for the application of technological innovations in foreign language learning by students in higher education, changes were observed in the formation of students' interest in technological innovations in foreign language classes as new ways of organizing cognitive activity in the higher education environment (Figure 1). Thus, 50% of EG students rated the system with the maximum score of "five", and 19% of CG students. According to the results of the use of technological innovations, EG students showed interest in reflection – 50% of respondents recognized it with a score of "five", in CG – 19% of respondents. 63% of EG students demonstrated interest in the use of innovative technologies. In CG, this percentage was 29%. Let's consider the results of the formative experiment according to the specific components we have identified.

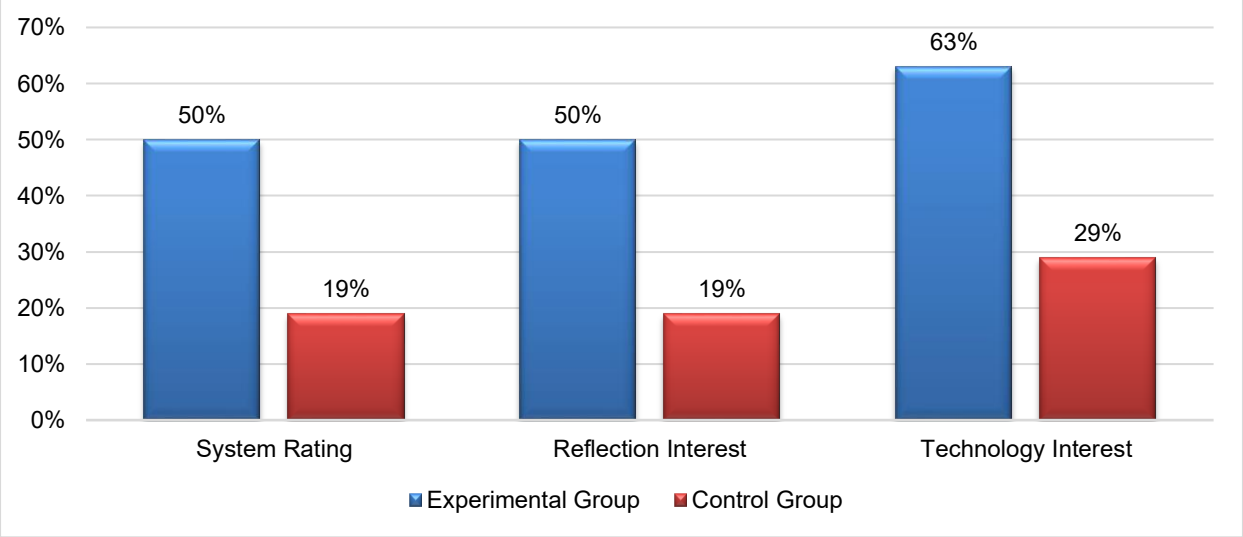

Figure 1. Student Interest in Technological Innovations.

Motivational component (attitude towards technological innovations, their introduction into the educational process, the need for innovations in the process of teaching foreign languages, cognitive interest in the introduction of technological innovations in higher education);

Analysis of the assessment results of students' knowledge shows a positive and consistent influence of the motivational component on the development of their readiness to apply technological innovations in learning foreign languages for their future professional activities. It was established that in the EG, the following results were obtained for the motivational component (Figure 2):

– A high level of students' readiness to apply technological innovations when learning foreign languages in their future professional activities was found in 32% of the EG respondents.

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- An average level of students' readiness to apply technological innovations when learning foreign languages in their future professional activities was found in 53% of the EG respondents.
- A low level of students' readiness to apply technological innovations when learning foreign languages in their future professional activities was found in 15% of the EG respondents.

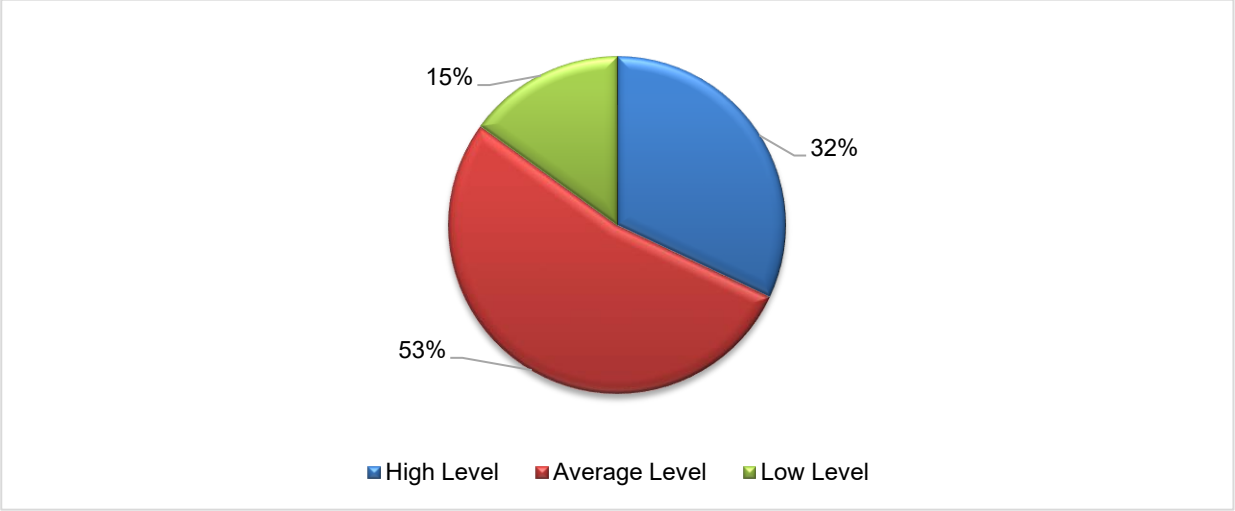

Figure 2. Levels of students' readiness to apply technological innovations in learning foreign languages (Motivational Component, EG).

It was established that in the CG, the following results were obtained for the motivational component (Figure 3):

- A high level of students' readiness to apply technological innovations in learning foreign languages in their future professional activities was found in 5% of the CG respondents.
- An average level of students' readiness to apply technological innovations in learning foreign languages in their future professional activities was found in 38% of the CG respondents.
- A low level of students' readiness to apply technological innovations in learning foreign languages in their future professional activities was found in 57% of the CG respondents.

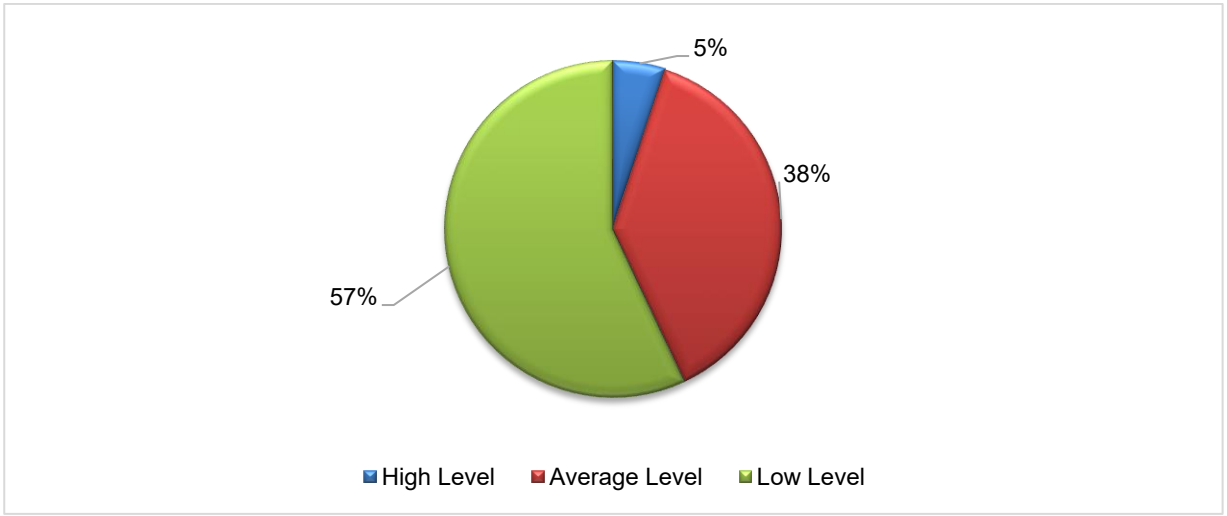

Figure 3. Levels of students' readiness to apply technological innovations in learning foreign languages (Motivational Component, CG).

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The majority of CG students demonstrated a low level of knowledge.

Activity component (level of knowledge formation about technological innovations in foreign language teaching, level of initial achievements of students, level of skills formation in implementing technological innovations in foreign language teaching);

Analysis of the results of student knowledge control indicates a positive natural influence of the activity component on the formation of students' readiness to apply technological innovations in foreign language learning in future professional activities. It was established that in the EG, the following results were obtained for the activity component (Figure 4):

- A high level of students' readiness to apply technological innovations in foreign language learning was found in 33% of EG respondents.
- An average level of students' readiness to apply technological innovations in foreign language learning was found in 53% of EG respondents.
- A low level of students' readiness to apply technological innovations in foreign language learning in future professional activities was found in 14% of EG respondents.

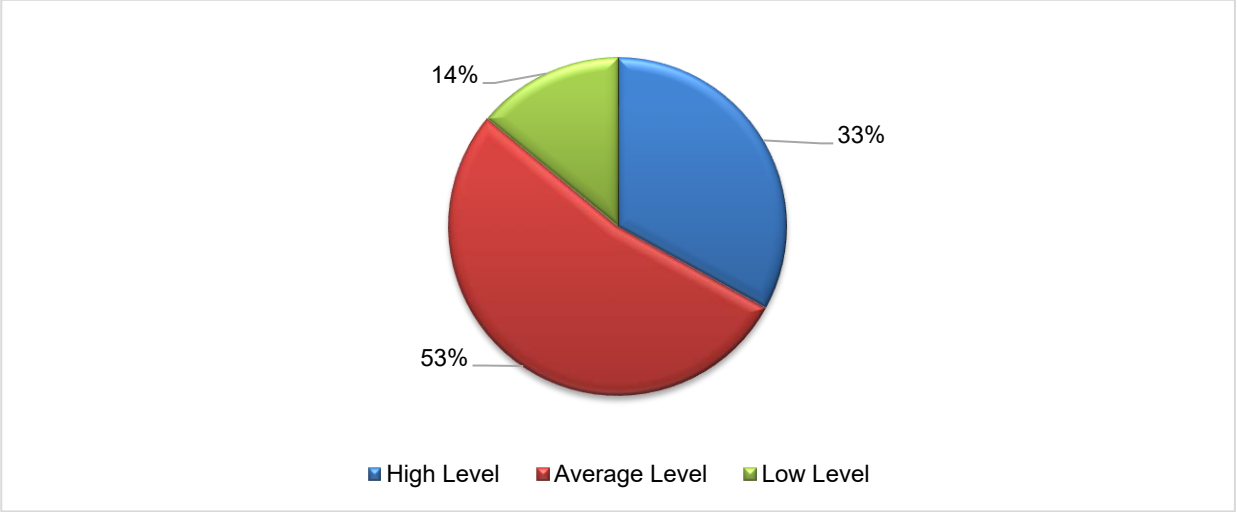

Figure 4. Levels of students' readiness to apply technological innovations in learning foreign languages (Activity Component, EG).

It was established that in the CG, the following results were obtained by the activity component (Figure 5):

- A high level of students' readiness to apply technological innovations in learning foreign languages in their future professional activities was found in 5% of the CG respondents.
- an average level of students' readiness to apply technological innovations in learning foreign languages in their future professional activities was found in 37% of the CG respondents.
- A low level of students' readiness to apply technological innovations in learning foreign languages in their future professional activities was found in 58% of the CG respondents.

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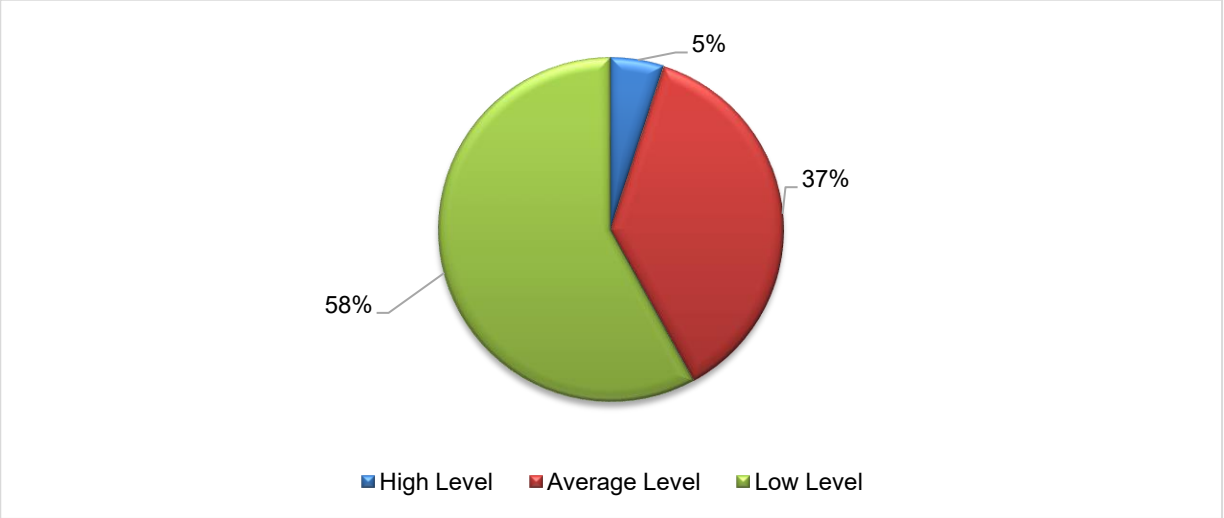

Figure 5. Levels of students' readiness to apply technological innovations in learning foreign languages (Activity Component, CG).

Reflective component (the nature of the manifestation of students' personal and professional qualities in the process of implementing innovative technologies in learning foreign languages, readiness for self-development, and ability to reflect).

Analysis of the results of controlling students' knowledge indicates a positive, natural influence of the reflective component on the formation of students' readiness to apply technological innovations in learning foreign languages in their future professional activities. It was established that in the EG, the following results were obtained for the reflective component (Figure 6):

- A high level of students' readiness to apply technological innovations in learning foreign languages was found in 35% of EG respondents.
- An average level of students' readiness to apply technological innovations in learning foreign languages was found in 50% of EG respondents.
- A low level of students' readiness to apply technological innovations in learning foreign languages in their future professional activities was found in 15% of EG respondents.

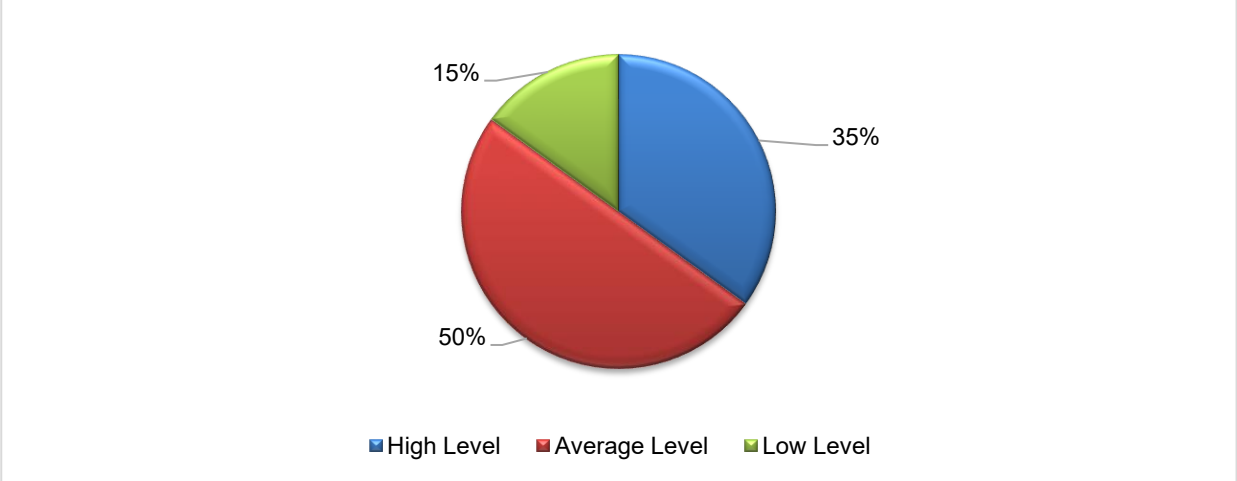

Figure 6. Levels of students' readiness to apply technological innovations in learning foreign languages (Reflective Component, EG).

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It was established that in the CG, the following results were obtained for the reflective component (Figure 7):

- A high level of students' readiness to apply technological innovations in learning foreign languages in their future professional activities was found in 10% of CG respondents.
- An average level of students' readiness to apply technological innovations in learning foreign languages in their future professional activities was found in 29% of CG respondents.
- A low level of students' readiness to apply technological innovations in learning foreign languages in their future professional activities was found in 61% of CG respondents.

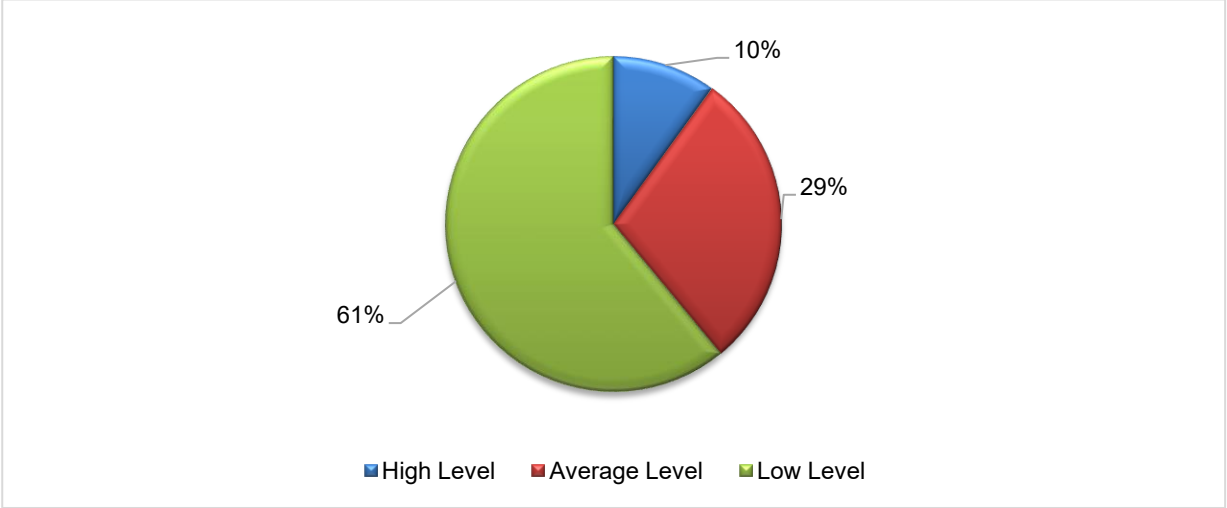

Figure 7. Levels of students' readiness to apply technological innovations in learning foreign languages (Reflective Component, CG).

According to the Pearson chi-square criterion, the results of the statistical assessment of the formation of students' readiness to apply technological innovations in learning foreign languages in their future professional activities after the experiment allow us to state the prevalence (at $p \leq 0.05$) of the indicators $\chi^2_p > \chi^2_{cr}$, which is the basis for rejecting the null hypothesis. Therefore, hypothesis H1 is an alternative. It confirms the statistical significance of the results obtained.

The results of the study turned out to be statistically significant. The study proves that the implementation of the EG system of applying technological innovations in learning foreign languages by students in higher education is effective, and it was this that had a positive impact on the level of formation of students' readiness to apply technological innovations in learning foreign languages in their future professional activities.

Conclusions

The content of technological innovations in the study of foreign languages is revealed. The subject and procedural sides of innovations are presented. The main groups of innovations are analyzed. Specific principles that are effective in teaching foreign languages to students of higher education institutions are presented. The main innovative types of educational activities in a higher education institution that are most progressive and perceived by students in the study of foreign languages are highlighted. The importance of multimedia technologies, distance, electronic, computer, and web-based learning, etc., is shown.

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An experimental study was conducted, the purpose of which was to verify the effectiveness of the system of application of technological innovations in the study of foreign languages by students of higher education institutions.

By conducting a pedagogical experiment, the research hypothesis was tested.

Research and experimental work were carried out in several stages. The purpose of each stage involved the performance of tasks for the purpose of further processing the data obtained. To diagnose the formation of students' readiness in future professional activities to use technological innovations, criteria, indicators, and levels were determined.

Based on the conducted assessment section, conclusions were drawn about the insufficiency of the implementation of technological innovations in the study of foreign languages. The main purpose of the questionnaire was to determine students' attitudes to the implementation of technological innovations in higher education institutions in the study of foreign languages for their further implementation in future professional activities. Therefore, pedagogical conditions were developed for the formation of students' readiness to use technological innovations in the study of foreign languages by students in higher education and in future professional activities. The theoretically substantiated system of application of technological innovations in the study of foreign languages by students in higher education was practically implemented in the educational process of EG.

In the process of research, we compared the results of the ascertainment stage and the control stage of the experiment, which was evidence of the validity of the hypothesis put forward by us. Qualitative and quantitative analysis of data obtained by diagnostic means during targeted, long-term monitoring of the process and results of students' learning allows us to say that the developed system of application of technological innovations in the study of foreign languages by students in higher education is effective.
Using the EXEL program, statistical processing of the obtained data was carried out based on the non-parametric Pearson criterion – chi-square (χ^2).

According to the Pearson chi-square criterion, the results of the statistical assessment of the formation of students' readiness to apply technological innovations in the study of foreign languages in future professional activities after the experiment allow us to state the prevalence (at $p \leq 0.05$) of the indicators $\chi^2_p > \chi^2_{cr}$, which is the basis for rejecting the null hypothesis. Therefore, the hypothesis H1 is an alternative. It confirms the statistical significance of the obtained results.

The results of the study turned out to be statistically significant. The conducted research proves that the implementation of the system of application of technological innovations in the study of foreign languages by students in higher education is effective, and it was this that positively influenced the level of readiness of EG students to apply technological innovations in the study of foreign languages in their future professional activities.

The conducted research does not exhaust all aspects of the problem. Further research is required to improve the professional training of students and update the technological and didactic support of the educational process in the conditions of digitalization of education.

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