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Eficiencia de las tecnologías digitales en el desarrollo de estrategias de comprensión auditiva para estudiantes de instituciones de educación superior

The efficiency of digital technologies in the development of listening comprehension strategies for students of higher educational institutions

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Resumen

El objetivo del artículo es un estudio práctico de la efectividad de las tecnologías digitales en el desarrollo de estrategias de comprensión auditiva en futuros filólogos pertenecientes a instituciones de educación superior (IES). En la metodología, la investigación involucró la encuesta por cuestionario y la técnica delphi. Para el procesamiento de datos matemáticos se utilizaron las pruebas de Anderson-Darling, Cramér-von Mises, Kolmogorov-Smirnov y Shapiro-Francia, así como la prueba t de Student. Los resultados notan que el nivel de habilidades de comprensión auditiva de los estudiantes en los grupos de control (GC) y experimental (GE) es aproximadamente el mismo (52% y 56%). El nivel predominante de aprendizaje de la materia en GC y GE es umbral, lo que indica una insuficiente formación de los alumnos en esta dirección. En conclusión, el estudio reveló la alta eficiencia de las tecnologías digitales en el desarrollo de estrategias de comprensión auditiva de los futuros filólogos. Se comprobó experimentalmente la relación entre una alta

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capacidad para percibir auditivamente una lengua extranjera y el uso de herramientas educativas multimedia digitales.

Palabras clave: Lenguas extranjeras, educación, lingüística, comprensión, tecnología.

Abstract

The aim of the article is a practical study of the effectiveness of digital technologies in the development of listening comprehension strategies in future philologists in higher educational institutions (HEIs). In Methodology, the research involved the questionnaire survey and the delphi technique. Anderson-Darling, Cramér-von Mises, Kolmogorov–Smirnov and Shapiro–Francia tests, as well as Student’s t-test were used to process mathematical data. It can be noted that the level of students’ listening comprehension skills in the control (CG) and experimental (EG) groups is approximately the same (52% and 56%). The prevailing level of learning the material in CG and EG is threshold, which indicates insufficient training of students in this direction. In conclusion, the study revealed the high efficiency of digital technologies in the development of listening comprehension strategies of future philologists. The relationship between a high ability to perceive a foreign language aurally and the use of digital multimedia educational tools was experimentally proven.

Keywords: Foreign languages, education, linguistics, comprehension, technology.

Introduction

The higher education is being modernized, and digital transformation is an important aspect in this process. The driver of digitization is the formation of a digital society. A distinctive feature of digitalization of education is the transition to a personalized and effective educational process in the electronic information and educational environment. Today, there is a trend toward the digitalization of economic and socio-political life. That is why it is important to create conditions for the development of a digital society in higher education institutions (Abdullah, 2021). The modern multicultural, multilingual world makes demands for the mastery of foreign languages in higher education institutions, in particular, English. At the current stage, it is necessary to master a foreign language both as a means of communication and as a means of achieving professional fulfilment of the individual in the future. That is why the issue of the use of digital technologies in developing the ability to perceive speech is a primary task of the system of higher philological education (Widodo et al., 2022).

At the same time, the pedagogical design of the educational process should be based on the integration of effective approaches to digitalization with due regard to the psychological and

pedagogical features of modern students. The digitalization provides significant opportunities for building students' individual educational trajectories during the organization of the educational process. This organization of the educational process enables flexible adjustment of the trajectory of students' training (Barotovna, 2021). However, such models have not been developed. This entails the problem of pedagogical design of personalized adaptive training of students of philological majors in context of digitization of education (Poliakova, 2022).

The ability to understand oral speech is an important criterion for mastering a foreign language (Kulmagambetova & Batyrgalieva, 2021). Listening means only the acoustic perception of the sound scale, while listening comprehension is the process of language perception, understanding and interpretation of audile information. Listening comprehension can be an independent type of language activity or can be included in dialogic communication as its receptive component, that is, be one of the components of speech (Kochubei, 2022). During listening comprehension, the listener performs complex perceptual-mnemonic activities and mental operations of analysis, synthesis, deduction, induction, comparison, contrast, abstraction, concretization, etc. (Ismail & Aziz, 2020). In this case, Linguistic, psychological and methodological components are distinguished in the structure of training listening comprehension skills (Table 1). When learning this receptive type of language activity, it is necessary to strive for a one-time perception of the text (Ma & Yan, 2022).

Table 1*Structure of training listening comprehension skills*

Linguistic component	Psychological component	Methodological component
a) methodically organized lexico-grammatical and phonetic minimum; b) difficulties associated with the perception of the language form; c) requirements for texts for listening comprehension (cognitive orientation, fabulous content, simplicity for understanding of texts from a linguistic point of view, authenticity of texts)	a) study of students' motives and interests; b) auditory skills and abilities; c) professional abilities (phonemic and intonation hearing, language anticipation); d) psychological mechanisms — long-term and operational memory; recognition and reconciliation; understanding; e) difficulties associated with the perception of language form; f) the nature of the connection between listening comprehension and other types of language activity (primarily speaking)	a) skills of independent work on listening comprehension; b) the use of various supports that facilitate the understanding of what has been heard.

Source: prepared by the author of the article

Listening comprehension is understanding and perceiving speech aurally (Akazhanova, 2021). It is a perceptive mental mnemonic activity. Listening should occupy an important place at the initial stage of language learning (Qureshi et al., 2021). Mastery of listening comprehension allows fulfilling pedagogical, educational and developmental goals. It allows teaching students to listen carefully to a speech, to develop the ability to predict meaningful utterances and, thereby to cultivate a culture of listening not only in a foreign language, but also in their native language. Developing the ability to understand language aurally is of educational value, as it has a positive effect on the development of memory, and, above all, auditory memory (Mohammed, 2020).

The main issue is still the absence of the system of exercises aimed at developing students' listening skills with the use of digital technologies, while they have great potential. The advantages of digital technologies are as follows: 1) simplicity for understanding and variety; 2) authenticity and originality; 3) availability of a socio-cultural component, along with the linguistic one; and 4) availability of presence motivating and entertaining components along with cognitive and informational ones, etc.

The use of digital technologies in teaching listening comprehension will help to enhance students' cognitive activity, will contribute to a deeper understanding of the educational material. In sight of the previous, the aim consists in an empirical evaluation of the effectiveness of the use of digital technologies (video materials) during the development of listening comprehension strategies in future philologists. As objectives/questions of research are: 1. Identify ways and tools for the development of students' listening comprehension skills with the use of digital technologies; 2. Test the effectiveness of the system of tasks and pedagogical conditions for the development of students' listening comprehension skills with the use of digital technologies in the course of research and experimental work.

Methodology

Design

Research and experimental work on the development of students' listening comprehension skills with the use of digital technologies (video materials) was divided into several stages: First stage, Summative stage (2020), a survey of theoretical studies on the problem; identification of general theoretical provisions; collection of data on the level of education of students of the control and experimental groups before the study.

Second stage, Formative stage (2021), a development of a system of tasks aimed at developing students' listening comprehension skills with the use of video materials. The use of this system in the experimental group during research and experimental work. Third stage, Control stage (2022), evaluating the effectiveness of the implementation of the system of tasks aimed at the development of students' listening comprehension skills with the use of video materials; carrying out control tests of listening comprehension skills; data analysis, generalization of the results of work.

The null statistical hypothesis H_0 is that the formation of listening comprehension strategies does not depend on the teaching method. The alternative statistical hypothesis H_1 is that the development of listening comprehension strategies is more effective when using digital technologies in education. The development of listening is directly related to the use of innovative educational technologies for immersion in the language environment.

Participants

The respondents were chosen by drawing lots among the students of the Department of English Philology and Translation. Students of 3rd-4th years of study participated in research and

experimental work. The control group consisted of 100 people, including 25 young men and 75 girls. The experimental group consisted of 100 people, including 11 were boys and 89 girls. The age composition of the study groups was the same; groups studied according to the same educational standard of higher education.

One team of teachers worked with groups in the course of theoretical and practical training. Pedagogical conditions of the use of digital technologies in education were applied to the students of the experimental group. The control group students studied according to the standard methods. An expert group consisting of 15 teachers of the Foreign Language Department also participated in the study.

Instruments

Google Forms were used for the survey. Microsoft Excel and SPSS Statistics 19.0 were used for data entry and processing. All data are given in relative values (% of the number of respondents). The reliability of research methods and instruments was tested using the Alpha-Cronbach test. Values of 0.7 - 0.8 are considered satisfactory (Ali & Bhaskar, 2016). The formula calculates the Alpha-Cronbach coefficient:

$$(1) \quad \frac{N}{N-1} \left(\frac{\sigma_x^2 - \sum_{i=1}^N \sigma_{Y_i}^2}{\sigma_x^2} \right),$$

where σ_x^2 – dispersion of the score of the entire test;

$\sigma_{Y_i}^2$ – dispersion of i element.

Data collection

The choice of methods, the sequence and technique of their application are determined by the aim and objectives of the research. The study involved the following research methods: a *Questionnaire survey*. The students reflected their opinion about these skills with the help of several questions contained in the questionnaire (Appendix A), which allowed us to study their problems and difficulties in learning listening comprehension and speaking skills. Cronbach's Alpha criterion is equal to 0.72, which gives confidence in the reliability of the technique.

Also, *The Delphi technique based on the criteria of the level of development of the listening comprehension strategy* (Steinberg & Down, 2020). The conditions for the development of listening comprehension skills show that the main factors affecting the effectiveness of this process are:

- 1) motivation of students for listening comprehension;
- 2) mechanisms of comprehension, memory, and prediction of listening comprehension results;
- 3) language actions of students.

Therefore, the following criteria for determining the level of development of listening comprehension skills will be considered:

- 1) motivational;
- 2) cognitive;
- 3) executive (Table 2).

Cronbach's Alpha criterion is 0.71. This allows us to talk about the reliability of the methodology.

Table 2
Criteria for determining the level of listening comprehension skills

Criteria	Description of the criterion	Diagnostic methods
<i>Motivational</i>	Reproduction of motivational characteristics of the individual: needs; goal setting; motives; systems of motivation	<i>Questionnaire survey</i>
<i>Cognitive</i>	Reproduction of knowledge taking into account: mental operations; comprehension mechanisms; memory; probabilistic forecasting.	<i>Certification, delphi technique</i>
<i>Executive</i>	Reproduction of skills: aural understanding of the text; performing language acts	<i>Delphi technique</i>

Source: prepared by the author of the article

Analysis of data

Anderson-Darling, Cramér-von Mises, Kolmogorov–Smirnov and Shapiro–Francia tests were conducted to formally verify whether the data were subject to the normal distribution law. With these criteria, we tested the hypothesis H_0 : “the data are subject to a normal distribution” against the alternative H_1 — “ H_0 is not valid” (Roldan, 2021).

- 4. Student’ t-test was calculated (Formula 2):

$$(1) \quad t = \frac{x_1 - x_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

where X_1 and X_2 denote the samples;

n_1 – the number of respondents at the input control;

n_2 – the number of respondents at the final control;

s means the root-mean-square deviation (Formula 3):

$$(3) \quad s_x = \sqrt{\frac{1}{(n-1)n} \sum_{i=1}^n (x - x_i)^2}$$

Ethical criteria

All respondents were asked to answer the survey questions honestly and impartially. The survey was conducted based on the general norms and rules of ethics. All respondents gave their consent to the personal data processing and the use of research results for the publication of the article.

Results

The dynamics of learning outcomes in EG and CG are presented in Figure 1 and 2, respectively. The radar charts show the percentage of students with basic and advanced levels, that is, the “productive” level of competence at the initial and final stages of the experiment.

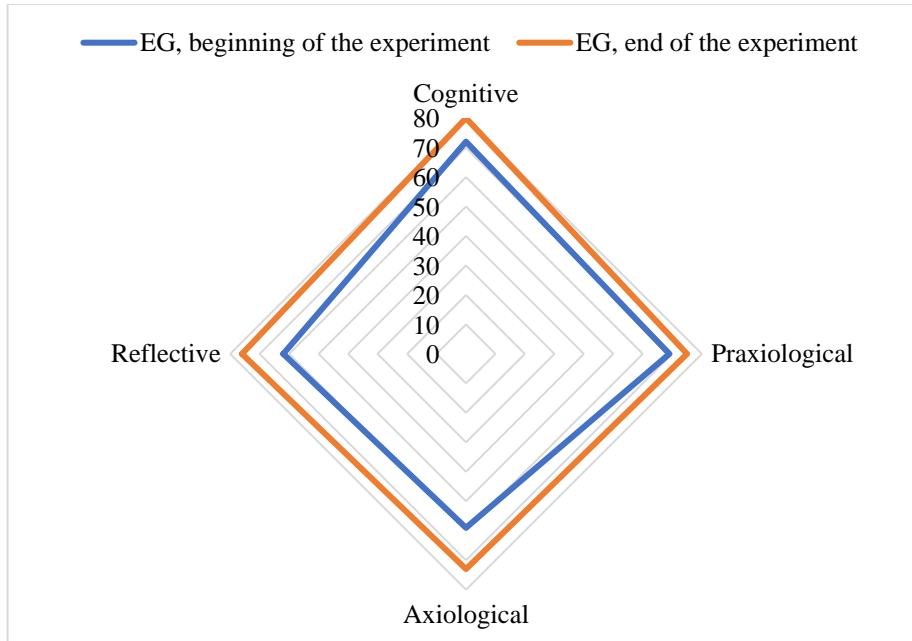


Figure 1. Dynamics of the level of listening comprehension competence in the EG

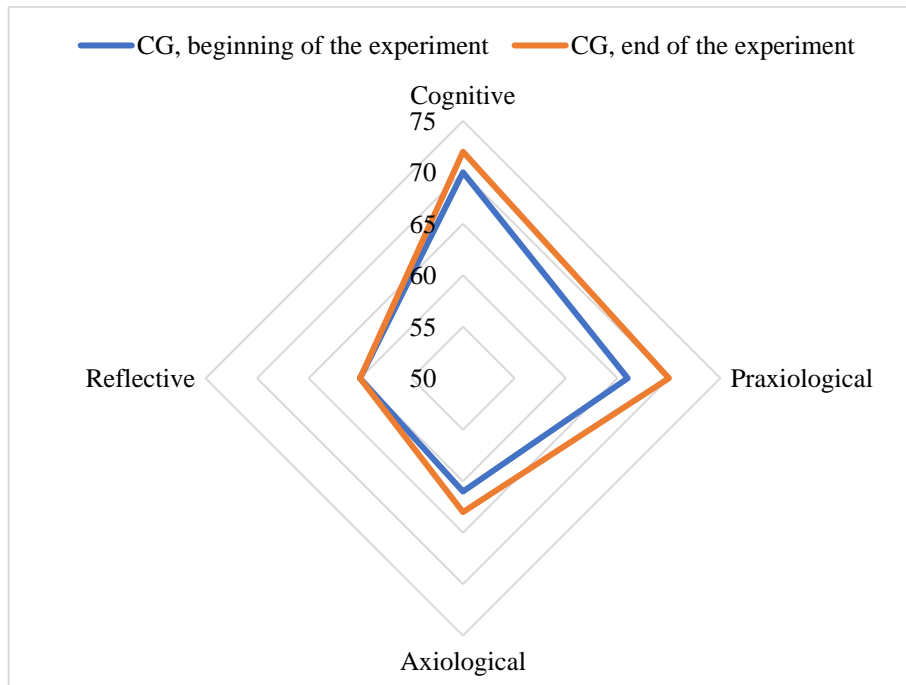


Figure 2. Dynamics of the level of listening comprehension competence in the CG

Competence development through the methodology proposed in the study with the use of digital technologies in the experimental group is more effective. The biggest differentiation is observed for the cognitive, praxeological and reflective criteria. The increase in the cognitive component is determined by the implementation of educational content adaptation strategies and multiple control of the students' self-study process. A significant increase in the praxeological component is determined by the enhanced activity of students in the educational process and, accordingly, the development of the activity component.

The growth dynamics of the reflective component is determined by the regular inclusion of self-assessment methods and mechanisms for operational monitoring of one's own learning outcomes. The growth of the axiological component is connected with the inclusion of the block of controlling influences in the structure of the educational process management sub-model. In this case, Figure 3 illustrates the results of respondents' answers to the questions contained in the questionnaire. Answering the first question, most of the respondents note that they do not speak properly during English lessons.

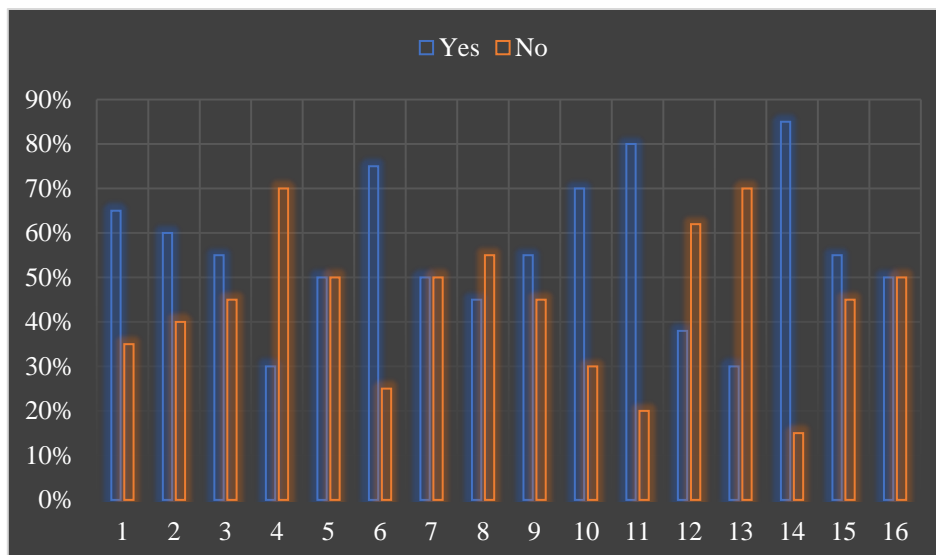


Figure 3. The results of respondents' answers to the questions proposed in the questionnaire

Only one-third of the participants feel that they cannot communicate in English with other people, while two-thirds are able to do so with some difficulty. Regarding the potential of comprehension of native speakers, the results are very different. More than half of the students believe that they understand native speakers, but 40% believe that it is very difficult or almost

impossible. They admit that they usually listen to their teacher and, in some cases, listen to audio materials.

A small number of respondents say they can watch the original version of a movie and learn what it's about or what the characters are saying, while 70% of respondents sometimes watch the original versions of movies. Finally, half of the respondents admit that they usually listen to songs in English and fully understand what they are about without subtitles or lyrics, while others say they can learn a song by heart, but they don't fully know what it says or how words in texts shall be written.

Despite the importance of this type of activity, a large number of students say that they rarely do this in class because they are practicing grammar or reading more, and it hinders the development of speaking. Analysing the obtained results related to the understanding of different accents, about 55% of students believe that their pronunciation is quite good and they are able to understand spoken expressions. The rest of the students believe that they are able to demonstrate clear language, but they face some problems.

Four out of five students support the importance of listening and speaking skills as they identify them as mandatory and necessary when learning a new language. Many of them understood very well the importance of listening and speaking skills and that they should take more time in English classes. Moreover, many students believe that improving these skills is the best way to communicate in the outside world, which is very important when communicating with foreigners and native English speakers. They recognize that it is essential to know more than one language other than their mother tongue. So, all students in the selected groups answered all 16 questions they received before the test. This is why the survey was completed by 100%. The reliability of the results of research and experimental work using methods of statistical data analysis were evaluated. As an example, we will verify the reliability of the results of the input and final control of students of the experimental and control groups (Table 3).

Table 3
Verifying the normality of data in the EG at the beginning of the experiment

Test	Test statistics	p-value	A level	Conclusion
Anderson-Darling	A = 0.66084	0.08258	0.05	We accept the hypothesis H ₀ on the normality of the distribution
Cramér-von Mises	W = 0.09589	0.1266	0.05	We accept the hypothesis H ₀ on the normality of the distribution
Kolmogorov-Smirnov	D = 0.06812	0.164	0.05	We accept the hypothesis H ₀ on the normality of the distribution
Shapiro-Francia	W = 0.98075	0.0656	0.05	We accept the hypothesis H ₀ on the normality of the distribution

Source: prepared by the authors based on the results of the study

Analysing the results of the tests, we can note that the obtained p-value is greater than a fixed level of significance for each test. Therefore, there is no reason to reject the H₀ hypothesis about the normality of the data distribution in the experimental group at the beginning of the experiment at the significance level of 0.05. Similar work was carried out for the data of the control group at the beginning of the experiment (Table 4).

Table 4
Verifying the normality of data in the CG at the beginning of the experiment

Test	Test statistics	p-value	α level	Conclusion
Anderson-Darling	A = 0.69777	0.06686	0.05	We accept the hypothesis H ₀ on the normality of the distribution
Cramér-von Mises	W = 0.10571	0.09276	0.05	We accept the hypothesis H ₀ on the normality of the distribution
Kolmogorov-Smirnov	D = 0.075773	0.0764	0.05	We accept the hypothesis H ₀ on the normality of the distribution
Shapiro-Francia	W = 0.9824	0.0923	0.05	We accept the hypothesis H ₀ on the normality of the distribution

Source: prepared by the authors based on the results of the study

The results of formal tests of the CG data also confirm that the CG data follow a normal distribution. In all tests, the p-value significantly exceeds the fixed level of significance, so it can be concluded that the data of the control and experimental groups at the beginning of the experiment are homogeneously distributed. Table 5 presents the results of Student's t-test.

Table 5*The results of Student's t-test*

	At the beginning of the experiment	At the end of the experiment
Student's t-test statistics	t = 0.82634	t = -5.7036
p value	0.5214	
A level	0.05	
Conclusion	<i>Ho is rejected</i>	<i>Ho is accepted</i>
Interpretation	No statistically significant differences were found between groups.	Statistically significant differences were found between groups.

Source: prepared by the authors based on the results of the study

The analysis showed no statistically significant differences at the beginning of the experiment between the CG and EG students. The t-test statistic is less than the critical value and is statistically insignificant. The null hypothesis is accepted and the alternative hypothesis about the existence of statistically significant differences between CG and EG at the beginning of the experiment is rejected.

Discussion

Unlike writing, reading or even speaking, listening comprehension is given the least systematic attention in the process of learning a foreign language. According to Abdullah (2021), listening comprehension strategies receive too little attention during the training of future specialists in philology. As Barotovna (2021) notes in her work, the process of teaching listening comprehension is still in the development stage. Students need to use the language in real life situations, not just to do written work.

On the contrary, Ebrahimi and Elahifar (2021) and Shamsitdinova (2021b) note that the current level of implementation of various listening comprehension strategies is high. Researchers note an increased ability to perceive speech by ear by 15%. At the same time, the authors note the need to pay attention to the content of foreign language study programmes. According to the above-mentioned authors, the foreign language training programme should first of all solve the problem of developing communicative competences. The issue of the use of digitization tools in the work of teachers of higher educational institutions is directly related to the teachers' IT competencies.

In his article, Tolochko (2021) notes that the current level of readiness of pedagogical workers to use digitization tools during lectures and practical work remains low. A considerable role is played by the ability of listening comprehension at the initial stage of foreign language learning. Kulmagambetova and Batyrgalieva (2021) note the need for listening comprehension at the initial stage of foreign language learning. The authors note that if the teacher does not have very good skills, students will not be able to understand him or her correctly. English teachers play an important and crucial role in helping students overcome difficulties in communicating their thoughts after listening to other people's English (Ishchenko et al., 2022).

Listening comprehension strategies can be as follows. 1. Teachers should provide their students with various activities to simplify and facilitate understanding of the curriculum. 2. The teacher can motivate students by providing them with appropriate feedback related to the topic studied in class. 3. Students should be able to ask and answer questions; they should know how to interrupt the lecturer to clarify information. Only in this case the teacher can identify their doubts and correct them by making his or her students actively participate in many other activities related to listening comprehension, as Znanetskyi (2022) and Sikora (2022) noted. In turn, Altunkaya (2018) emphasizes the need to develop listening skills and a comprehensive approach to the formation of all foreign language abilities. The author does not separate the ability to hear a foreign language from other foreign language competencies. A comprehensive approach makes it possible to increase the competence of auditory perception by 17%.

On the contrary, Manko et al. (2022) point to the need to stimulate interest in self-study of a foreign language using digital means starting from the initial stage. In their study, Kulmagambetova and Batyrgalieva (2021) give preference to the method of learning a language using educational videos. According to researchers, this organization of both in-class and extracurricular work gives great results in mastering the ability to perceive speech aurally. The

research of Šilonová et al. (2021) is also worth mentioning, where they attach a great role to digitization during the organization of students' performance testing. Digital tools help in the organization of both synchronous and asynchronous monitoring of students' progress.

The main limitations are due to several factors. From the point of view of the organization of research design, there are no reliable methods of measuring the effectiveness of applying pedagogical conditions to form a respective competence. This prompts us to resort to expert evaluations, which may have a certain degree of involvement and the human factor. From the point of view of information collection problems, the study was complicated by quarantine measures against COVID-19. At the same time, the research used methods of statistical data analysis that make it possible to assert the reliability of the results without significant contradictions that would make the results falsified.

Conclusions

Testing the hypotheses H_0 and H_1 for EG and CG at the end of the pedagogical experiment, it was found that the t-test statistic exceeds the critical value and is statistically significant. This allows rejecting the null hypothesis and accept the alternative hypothesis on the statistically significant differences between CG and EG at the end of the experiment. This allows building an individual educational trajectory for each student.

Theoretical and practical provisions on the topic can help to present a more complete picture in the methodology of teaching English as a foreign language for students of higher educational institutions. The use of innovative technologies can comprehensively increase foreign language competences, including the ability to perceive language by ear. This is due to improving practical listening skills by immersing students in a foreign language environment. Despite the significant interest in the topic, the methodology of conducting listening comprehension using digital technologies still remains poorly developed. Further research should focus on finding effective digital tools of methodological and technical support for the development of listening comprehension strategies.

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