

The use of digital technologies for learning foreign languages in non-linguistic higher education institutions

*O uso de tecnologias digitais para aprendizagem de línguas estrangeiras em instituições de ensino superior não linguísticas*

*El uso de tecnologías digitales para el aprendizaje de lenguas extranjeras en instituciones de educación superior no lingüística*

Svitana Mudra<sup>1</sup>  
Alevtyna Miniailova<sup>2</sup>  
Olha Tamarkina<sup>3</sup>  
Liudmyla Baidak<sup>4</sup>  
Oksana Berezniak<sup>5</sup>

**Abstract:** *The aim of the work is to determine the effectiveness of the use of digital technologies for learning foreign languages in non-linguistic higher education institutions (HEIs). The aim was achieved through the use of general theoretical methods of comparison, observation, as well as calculations of the statistical significance, efficiency ratio, Phillips' correlation coefficient. The results showed that YouTube, Simpler, and Memrise are the easiest to use, as they do not require additional training for learning the functionality. Blackboard, Learn English, and Bussu applications have the greatest efficiency in classroom perception of the necessary information, as they are aimed at the complex interaction of understanding the theory and the performance of multi-directional tasks. According to students, Rosetta Stone, Learn English, and Memrise applications are the most favourable for self-study. Based on the Kirkpatrick Model, it was established that the majority of students achieved a high level of knowledge (72%). Although students believe that they have reached a medium level of knowledge to a greater extent, as they do not know all the necessary rules. It was found that during language learning students were primarily able to develop working memory (19%), cognitive flexibility (18%). They also gained independence in obtaining new knowledge (17%). The practical significance of the article is in the combination of various digital technologies for learning a foreign language by students of non-linguistic HEIs. The prospects for further research may be determining the effectiveness of learning of students of non-linguistic and linguistic educational institutions with the use of YouTube, Blackboard, Rosetta Stone, Learn English, Simpler, Memrise, Bussu.*

**Key words:** *Digital applications. Digital knowledge assessment. Personalized learning. Kirkpatrick model. Working memory.*

---

1 Candidate of Pedagogical Sciences, Associate Professor, Head of the Department of Language Training, Kyiv Institute of the National Guard of Ukraine, Kyiv, Ukraine, modern.pedagog22@gmail.com.

2 Candidate of Pedagogical Sciences, Associate Professor, Head of the Department of Modern Languages, Educational and Scientific Humanities Institute, Admiral Makarov National University of Shipbuilding, Mykolaiv, Ukraine, alev.minyajlova@gmail.com.

3 Candidate of the Pedagogical Sciences, Associate Professor, Department of Foreign Languages, Faculty of Biotechnological, Sumy National Agrarian University, Sumy, Ukraine, 52olgatam@gmail.com.

4 Senior Teacher of the Department of Foreign Languages, Faculty of Biotechnological, Sumy National Agrarian University, Sumy, Ukraine, bai14cs@ukr.net.

5 Senior Teacher of the Department of Foreign Languages, Faculty of Biotechnological, Sumy National Agrarian University, Sumy, Ukraine, ksiu.berezniak@ukr.net.

**Resumo:** O objetivo do trabalho é determinar a eficácia do uso de tecnologias digitais para a aprendizagem de línguas estrangeiras em instituições de ensino superior (IES) não linguísticas. O objetivo foi alcançado através da utilização de métodos teóricos gerais de comparação, observação, bem como cálculos de significância estatística, índice de eficiência, coeficiente de correlação de Phillips. Os resultados mostraram que YouTube, Simplr e Memrise são os mais fáceis de usar, pois não necessitam de treinamento adicional para aprendizado da funcionalidade. Os aplicativos Blackboard, Learn English e Bussu apresentam maior eficiência na percepção em sala de aula das informações necessárias, pois visam a interação complexa de compreensão da teoria e execução de tarefas multidirecionais. Segundo os alunos, os aplicativos Rosetta Stone, Learn English e Memrise são os mais favoráveis para o auto-estudo. Com base no Modelo Kirkpatrick, constatou-se que a maioria dos alunos atingiu um elevado nível de conhecimento (72%). Embora os alunos acreditem que atingiram em maior medida um nível médio de conhecimento, pois não conhecem todas as regras necessárias. Verificou-se que durante a aprendizagem da língua os alunos foram capazes de desenvolver principalmente a memória de trabalho (19%) e a flexibilidade cognitiva (18%). Também ganharam independência na obtenção de novos conhecimentos (17%). O significado prático do artigo está na combinação de diversas tecnologias digitais para aprendizagem de uma língua estrangeira por alunos de IES não linguísticas. As perspectivas para novas pesquisas podem ser a determinação da eficácia da aprendizagem de alunos de instituições de ensino não linguístico e linguístico com o uso de YouTube, Blackboard, Rosetta Stone, Learn English, Simplr, Memrise, Bussu.

**Palavras-chave:** Aprendizagem personalizada. Aplicações digitais. Avaliação de conhecimento digital. Memória de trabalho. Modelo Kirkpatrick.

---

**Resumen:** El objetivo del trabajo es determinar la efectividad del uso de tecnologías digitales para el aprendizaje de lenguas extranjeras en instituciones de educación superior (IES) no lingüísticas. El objetivo se logró mediante el uso de métodos teóricos generales de comparación, observación, así como cálculos de significancia estadística, índice de eficiencia y coeficiente de correlación de Phillips. Los resultados mostraron que YouTube, Simplr y Memrise son los más fáciles de usar, ya que no requieren capacitación adicional para aprender la funcionalidad. Las aplicaciones Blackboard, Learn English y Bussu tienen la mayor eficiencia en la percepción de la información necesaria en el aula, ya que están dirigidas a la interacción compleja de la comprensión de la teoría y la realización de tareas multidireccionales. Según los estudiantes, las aplicaciones Rosetta Stone, Learn English y Memrise son las más favorables para el autoestudio. Con base en el Modelo Kirkpatrick se estableció que la mayoría de los estudiantes alcanzaron un nivel alto de conocimientos (72%). Aunque los estudiantes creen que han alcanzado en mayor medida un nivel de conocimientos medio, al no conocer todas las reglas necesarias. Se encontró que durante el aprendizaje de idiomas los estudiantes fueron principalmente capaces de desarrollar la memoria de trabajo (19%), la flexibilidad cognitiva (18%). También ganaron independencia para obtener nuevos conocimientos (17%). La importancia práctica del artículo radica en la combinación de varias tecnologías digitales para el aprendizaje de una lengua extranjera por parte de estudiantes de IES no lingüísticas. Las perspectivas de futuras investigaciones pueden determinar la efectividad del aprendizaje de los estudiantes de instituciones educativas lingüísticas y no lingüísticas utilizando YouTube, Blackboard, Rosetta Stone, Learn English, Simplr, Memrise, Bussu.

**Palabras claves:** Aplicaciones digitales. Aprendizaje personalizado. Evaluación digital del conocimiento. Memoria de trabajo. Modelo Kirkpatrick.

---

## 1 INTRODUCTION

A traditional education system which involves a standard approach to education does not always motivate students to learn the necessary material. It is possible to solve this problem by searching for non-standard educational approaches, which will ensure the assimilation of terminology, new words, grammar, and vocabulary. A non-standard approach can be the use of digital technologies that affect the possibility of better perception of educational information. The identified ap-

proaches made it possible to reveal the relevance of future work.

Digital technologies can be identified as innovative systems that, with the help of interactive approaches, contribute to easier assimilation of information through visualization, game approaches (KLIMOVA et al., 2022; KONOTOP et al., 2021). Today, digital technologies are an effective element for achieving the necessary educational results, taking into account the students' individual capabilities. Digital technologies contribute to the modification of the educational process, and, consequently, to the

realization of the effectiveness of education, digital knowledge assessment, the selection of services for the personalization of education. The benefits of digital technologies can be used for foreign language learning in HEIs (O’Keeffe *et al.*, 2021). This is due to the fact that it is possible to ensure the study of foreign words without the technical memorization of large volumes of information. The use of approaches to visualization of materials, didactic materials adds to the formation of an associative series during the study of words, which promotes the development of critical thinking. The use of digital technologies provided an automated knowledge assessment, creating student rankings, thereby enhancing motivation (TAYLOR and MOHANTY, 2021). The effectiveness of learning a foreign language using digital technologies can be achieved as a result of developing critical thinking and communication skills. It can also be achieved because of the development of creative skills, creativity, flexibility, which contributes to the management of student’s own educational projects. Digital technologies in education allow for independent study of the subject, which is reflected in the change of assignments and develops the perception speed. Digital technologies enable providing a different combination of educational materials, which can be associated with a combination of textual, visual, multimedia information (ISHCHENKO *et al.*, 2022).

The use of synchronicity of learning can also be implemented with the help of digital technologies, which contributes to the simultaneous solution of tasks (RETELJ, 2022). It also promotes the exchange of acquired knowledge, which is especially important in the study of foreign languages for students of non-linguistic institutions. This ensures the achievement of a free command of practical knowledge and contributes to a better understanding of the studied information. Learning a foreign language contributes to the formation of educational and cultural potential, which allows to ensure the study of the culture of another country (PARK and SON, 2022). Digital technologies ensure the unification of educational programmes, which does not limit the development of professional

skills. Changing educational approaches with the help of digital technologies provide greater accessibility for individual students, ensure their independence and self-improvement (Munro, 2018). This stimulates students to gain new experiences.

The analysis of the theoretical material determined the advantages of digital technologies in learning a foreign language and, separately, the advantages for learning a foreign language in non-linguistic HEIs. Research gaps are related to the lack of combined approaches to foreign language learning in non-linguistic HEIs using digital technologies. The aim of the work is to determine the effectiveness of learning foreign languages with the use of digital technologies.

The aim involved the fulfilment of the following research objectives:

- develop a model of foreign language learning for non-linguistic HEIs with the use of digital technologies;
- determine the advantages of digital technologies (in the students’ opinion) taking into account their ease of use, the overall effectiveness of learning a foreign language, and the possibility of independent learning;
- determine the overall effectiveness of learning using the Kirkpatrick Model;
- determine the skills developed by students in the process of learning a foreign language.

## 2 LITERATURE REVIEW

Mobile applications contribute to the provision of mixed methods for learning a foreign language and arouse the students’ interest. Using the Blinkist programme allowed for the development of reading skills. This application helped to achieve the clarity of reading letters, improve the pronunciation of individual sounds. It is also necessary to ensure the grouping of sentences by content during the development of reading skills, which contributed to the expressiveness of reading (ZAMBOROVA and KLIMOVA, 2023).

Digital and multimedia technologies are a key element of effectiveness in learning a

foreign language, because they contribute to the acquisition of innovative knowledge and the realization of pedagogical ideas. Digital technologies improve students' philological and communicative competence. Learning a foreign language should be based on the use of an individual approach to learning, which affects students' self-development. Emphasis should be placed on speaking, listening, writing, reading considering specific trends in the development of digital technologies (Kosharna *et al.*, 2023).

The flipped classroom approach was used for learning Spanish as a foreign language. This approach relates to the use of digital technologies and the active involvement of students. Emphasis should be placed on ensuring the grammatical content of the lesson, expanding language skills. It was established that this approach to language learning promotes student independence, which is reflected in the overall effectiveness of learning (García-Allén, Taylor, 2023).

The use of digital technologies in learning a foreign language contributes to building professional competencies. Digitalization of learning also improves the organization of the learning process. The reading skills are developed in the first year of study, therefore, it is necessary to ensure the possibility of meaningful perception of information. Digital technologies provide syntagmatic segmentation of sentences, which contributes to the formation of correct intonation during reading (Antufieva *et al.*, 2023).

Learning Chinese as a foreign language requires coordination work, which can be implemented with the help of digital technologies. Identification of words and their written pronunciation should be provided during the learning process. For this purpose, the study of intersymbolic orthographic and semantic relations it necessary, which excludes confusion with individual words. Digital technologies contribute to the study of semantic similarities between words, the study of orthographic similarities. This promotes the development of students' thinking because of finding logical connections between words (SUN, PAE and AI, 2021).

Developing writing skills while learning a foreign language is a complex process and requires a high level of organization. This involves the development of linguistic knowledge, understanding of cultural aspects, rhetoric, and content. The use of digital technologies provides cognitive, social, emotional, linguistic advantages as a result of the expanded context of learning a foreign language (ZHU and QIN, 2022).

Digital technologies are a new impetus for the development of science, culture, and technology, which expands the scope of their activities. Artificial intelligence facilitates the exchange of educational materials when learning a foreign language, which enables organizing training among a large number of students. Artificial intelligence makes ensures the transparency of learning and the test of knowledge. However, a careful approach to the selection of educational materials should be ensured, which contributes to the expansion of vocabulary, promotes intensive reading and speaking (LU, 2020).

ChatGPT can be used as digital technology for learning a foreign language. In ChatGPT, learning is based on learning a general theoretical position. A sound analysis of the data, which is achieved as a result of the discussion, should be provided during learning. At the same time, the teacher has a flexible role that contributes to the development of students' independence (BIN-HADY *et al.*, 2023).

The analysis of studies showed that the majority of articles deal with the possibility of developing certain skills when learning a foreign language (speaking, writing, etc.). However, comprehensive training programmes that contribute to the learning of a foreign language by students of non-linguistic HEIs are poorly studied.

### 3 METHODS

#### 3.1 RESEARCH DESIGN

The first stage of the research provided for the development of a model of learning a foreign language for students of non-linguistic

HEIs. It was planned to use of digital technologies during learning. The development of the model involved a change in the approach to teaching the material, rather than the development of specialized lessons. The possibility of studying theoretical material, conducting practical classes and knowledge tests for students' understanding of their level were ensured when selecting the technologies. The capabilities of the selected digital technologies had to correspond to the elements of the learning model. The study lasted from January 2023 to May 2023.

The second stage of the research involved determining the advantages of digital technologies that were used during foreign language learning. The results were obtained from the students immediately after the end of the study period. Students had to determine which of the digital technologies in a separate block of the learning model had the greatest effectiveness. The following criteria were taken into account: - ease of use; - high level of assimilation of the necessary information; - the possibility of independent aware use of digital technologies.

The third level of research was based on determining the overall performance of students after learning. The Kirkpatrick Model was used for this purpose, which involved real assessment of students' knowledge and determining their relationship to the process of learning a foreign language. A high, medium or low level of knowledge was determined according to Kirkpatrick Model. The definition of positive, neutral, negative assessment was also provided. The third level of research additionally provided for determining the skills that were developed by students during the study of a foreign language. Determining the skills involved the analysis of student performance during the semester of study.

### 3.2 SAMPLING

To research involved 186 respondents who studied in non-linguistic HEIs. First-year students of the Department of Modern Languages of the Admiral Makarov National University

of Shipbuilding, the Department of Foreign Languages of Sumy National Agrarian University, and the Department of Language Training of the Kyiv Institute of the National Guard of Ukraine participated in the study. The sample of respondents was limited to first-year students in order to ensure equal conditions in education. It was also a mandatory condition to ensure that students learn English, which required the use of specialized applications. It was planned to involve 228 respondents at the initial stage of the research. But 42 students studied German, not English, which required the search for additional digital applications for learning German.

### 3.3 METHODS

The development of a model of foreign language learning by students of non-linguistic HEIs involved the use of a general theoretical method of comparison (RETELJ, 2022). It was planned to deliver theoretical and practical classes during the research, as well as to determine the acquired level of knowledge at the end of each study week. The comparison method was used to find relevant digital technologies during training. A comparison of more than 30 modern applications was planned, which involved conducting 20-minute classes. Based on the determined advantages and disadvantages of digital applications, YouTube, Blackboard, Rosetta Stone, Learn English, Simplr, Memrise, Bussu were selected for the use in learning. Examples of practical assignments created with the use of digital technologies are given in Appendix A.

Thurstone scale (Balla, 2023) was used to determine the advantages of digital technologies during foreign language learning according to students. According to the Thurstone scale, it was planned to ensure the selection of the application from each block of the learning model (studying theoretical material, conducting practical classes, testing knowledge), which was the most effective. At the same time, the effectiveness was determined based on the ease of use of a particular application, on the possibility of determining the level of assimila-

tion of the necessary information. It was also necessary to determine the possibility of using the application for self-study. The students' results were presented based on their own experience obtained during the learning period. According to the Thurstone scale, each of the technologies was given the corresponding points, where 1 is the lowest score. The results were obtained through the use of the Questionstar platform, which facilitates the conduct of various surveys. This platform was chosen because it provides the analysis directly after obtaining the data, charting with analytics. This allows for a better visual perception of information, automatic grouping of data. Questionstar is built on the basis of statistical calculations of correlation, Student's t-test, which excludes errors during data collection. The obtained results were used for additional calculations of the statistical significance, which was developed by the authors of the article:

$$k_{sig} = \frac{\sum(n_i h_{i(p)})}{m} \quad (1)$$

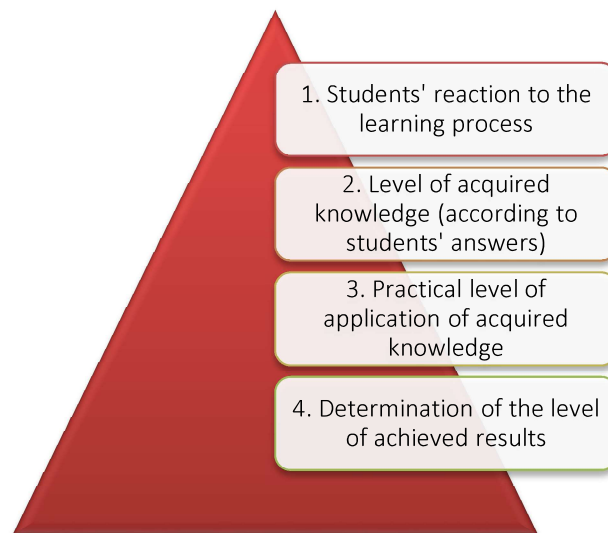
$n_i$  – the number of digital technologies in one block of study, which have an impact on the ease of their use/high level of assimilation of the necessary information/the possibility of independent aware use;

$h_{i(p)}$  – conditional evaluation of the used digital technologies for their ease of use/high level of assimilation of the necessary information/the possibility of independent aware use;

$m$  – the total number of digital technologies for research.

The effectiveness of the acquired knowledge of the students was determined through the use of the Kirkpatrick Model (WANG, 2021), which involves a detailed analysis of learning. According to the model, it was planned to use the parameters presented in Figure 1. These parameters reflect the real level of students' knowledge, as well as their assessment of the learning process.

Figure 1 – The elements of the Kirkpatrick Model



Source: Developed by the authors (2023).



The efficiency ratio developed by the authors of the article was calculated to determine the real level of students' knowledge.

$$f_{e\phi} = (s_t + q_p) \times l, \quad (2)$$

$s_t$  – an indicator that reflects the assessment of students' theoretical knowledge;

$q_p$  – an indicator that reflects the assessment of students' practical knowledge;

$l$  – a coefficient that reflects the general level of students' perception when learning a foreign language (it can be equal to 0.1 to 0.5, where 0.5 is the greatest value).

Skills that were developed in students during training were determined through a theoretical observation. The process involved comparing students' abilities before and after the study. The final results were presented in the main part of the work.

### 3.4 DATA ANALYSIS

Additional statistical calculations were carried out to ensure statistical confirmation of the obtained numerical data and to exclude possible errors. The calculation involved the use of the Phillips' correlation coefficient (MANN, KIAER and ÇAKIR, 2022). It was used to compare the advantages of digital technologies among themselves, to determine the overall efficiency according to the Kirkpatrick Model.

$$p = 1 - \frac{6 \sum d^2}{n^3 - n} \quad (3)$$

$d$  – the difference in ranks, which reflect the value of one number relative to others;

$n$  – the total number of elements for calculation;

$\sum d^2$  – the sum of the obtained rank difference.

Statistical confirmation of the relationship between items will be observed if the value approaches 1.

### 3.5 ETHICAL CRITERIA

The ethical standards of The Norwegian National Committee for Research Ethics in Sci-

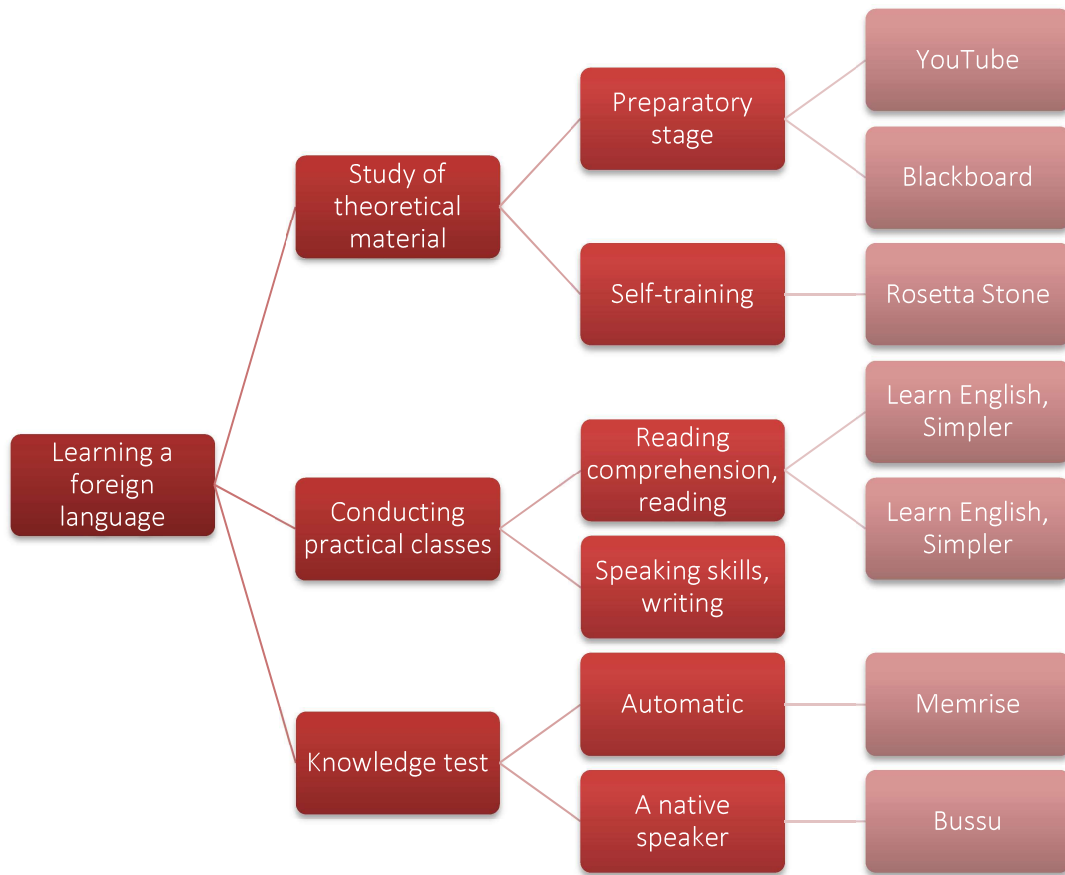
ence and Technology (2016) were followed during the research. It was also planned to adhere to the internal policy of the Admiral Makarov National University of Shipbuilding, the Sumy National Agrarian University, and the Kyiv Institute of the National Guard of Ukraine. The authors confirm the provision of equal conditions for all respondents, which excludes changing the training programme and the digital technologies used.

## 4 RESULTS

Learning a foreign language for students of non-linguistic majors requires the development of non-standard approaches to enhance students' learning motivation. An educational model that involved the use of digital technologies was developed to implement this approach (Figure 2).

According to the developed learning model, the study of theoretical material was supposed to provide a preparatory stage and self-study. The preparatory stage provided for the involvement of teachers in delivering theoretical material to students. Learning the rules, new words, features of their use and creating sentences involved the use of video lectures (YouTube) and the Blackboard application. The digital application enables studying the theory through a visual presentation of the material. The existing templates help to combine educational information, which contributes to better perception. It is also possible to ensure the use of materials available on the platform (in part or in full) to expand the possibilities of learning, eliminating its inconsistency or monotony. It was suggested to use the Rosetta Stone digital application for independent study of the theoretical material. It promotes the study of individual topics and words with the help of associations. During the study of theoretical material, it was planned to preserve the main academic programme as a result of the use of professional educational material.

Figure 2 – A model of foreign language learning by students of non-linguistic HEIs



Source: Developed by the authors (2023).

Conducting practical classes required an understanding of the studied theoretical material and was directly related to it. Using the Learn English programme made it possible to choose a variety of tasks for learning. This involved using words accurately, reading them, studying grammar or listening to audio files. The digital platform Simpler ensured personalization in learning a foreign language, as it involves a preliminary determination of the existing level of knowledge. The preliminary knowledge test ensures that the exercises are presented according to the students' level of knowledge. Using the Simpler platform allows for practical consolidation of theoretical knowledge by performing interactive exercises. The digital technologies used to provide practical classes are aimed at enhancing students' motivation through the creation of an automated ranking of each student's performance. Diversity in the conduct of practical classes contributes to the exclusion of monotony from education.

Knowledge testing should also be based on an automated system that promotes student motivation. The Memrise digital programme was used for the general test of knowledge during the lessons, which allowed to provide a general test of the studied material. Memrise promotes additional consolidation of learned information with the help of videos, as well as online games. Online games contribute to the creation of an appropriate ranking of students in learning a separate topic or a whole block of knowledge. The use of the Bussu digital programme made it possible to ensure that the assignments completed by students were checked directly by native English speakers.

The second stage of the research provided for determining which digital technologies, according to students, were more effective during the study period. Preferences were determined using Thurstone scale and statistical significance calculations (Table 1).



Table 1 – Advantages of digital technologies when learning a foreign language (according to students)

A type of digital technology	Ease of use	High level of assimilation of the necessary information	The possibility of independent aware use
Study of theoretical material			
YouTube	0.41	0.39	0.22
Blackboard	0.24	0.43	0.36
Rosetta Stone	0.37	0.32	0.45
Phillips' correlation coefficient	0.9107	0.9520	0.8401
Conducting practical classes			
Learn English	0.31	0.43	0.42
Simpler	0.44	0.38	0.35
Phillips' correlation coefficient	0.8018	0.9611	0.9532
Knowledge test			
Memrise	0.42	0.37	0.43
Bussu	0.34	0.44	0.36
Phillips' correlation coefficient	0.9531	0.8560	0.8307

Source: Developed by the authors (2023).

The use of Thurstone scale made it possible to determine that the YouTube platform is the easiest when studying theoretical material. This is due to the fact that the platform does not require specialized knowledge to use it. At the same time, it has the least importance in terms of independent aware use. Because it does not involve receiving feedback and requires the teachers' help to accurately understand the information. The Blackboard application contributes to the greatest assimilation of theoretical information, as it facilitates the easy presentation of educational material. This is determined by the use of specialized lectures, diagrams, drawings, which are reflected in the easier study of materials. Rosetta Stone enables an independent study of theoretical materials on the English language due to the depth of their understanding. The application helps to ensure active learning as a result of understanding the tasks. But without the teacher's help, Rosetta Stone does not enable learning all the theoretical material, because

it promotes the understanding of materials through associations, and is not based on memorizing a large number of rules.

According to the students, the Learn English programme is the best for conducting practical classes and acquiring a high level of knowledge. This is due to the ability to perform various assignments in the conditions of one platform, which enables avoiding the use of additional ones. The programme also allows for greater independence in studying materials due to the adaptation of assignments to the students' level of knowledge. The Simpler programme is easier to use, as it helps students to self-determine the acquired knowledge.

Memrise is a simpler programme for testing students' knowledge, as it is built on the automation of assignments and obtaining relevant results. The Bussu application is aimed at obtaining results directly after verification by a native speaker, which excludes automation. Independence of learning English can be achieved through the use of the Memrise ap-

plication, which enables controlling the quality of completion. A high level of assimilation of the necessary information can be achieved as a result of using the Bussu application, as it contributes to receiving feedback directly from native speakers of a foreign language.

The overall effectiveness of learning a foreign language was tested using the Kirkpatrick

Model. It was planned to determine the students' reaction to the learning process, to determine the level of acquired knowledge using the effectiveness model, as well as to determine the possibility of practical application of the acquired knowledge, the level of achieved results (Table 2).

Table 2 – Effectiveness of foreign language learning by students according to the Kirkpatrick Model

A parameter of the Kirkpatrick model	High level / positive reaction	Medium level / neutral reaction	Low level / negative reaction	Phillips' Correlation coefficient
Students' reaction to the learning process	96%	4%	-	0.0083
Level of acquired knowledge (according to students' answers)	65%	35%	-	0.024
Practical level of application of acquired knowledge	82%	18%	-	0.0117
Determination of the level of achieved results	92.5 (72%)	85 (27%)	53.6 (1%)	0.0039

Source: Developed by the authors (2023).

With the help of Kirkpatrick Model, it was established that the students' reaction to this approach to learning a foreign language was at a high level. Student evaluation is related to enhancing students' interest in learning through the use of interactive approaches. Digital technologies made it possible to develop independence skills, to ensure the assimilation of more information due to the use of associative approaches.

Students believe that the vast majority of students have achieved a high level of knowledge in the process of learning English. Such conclusions were made as a result of completing individual assignments with the help of digital technologies with automated knowledge assessment. But the overall grade, which depended on the teacher, was not known to the students. It was determined as a result of a general understanding of the studied topics and the possibility of applying theoretical knowledge in practice.

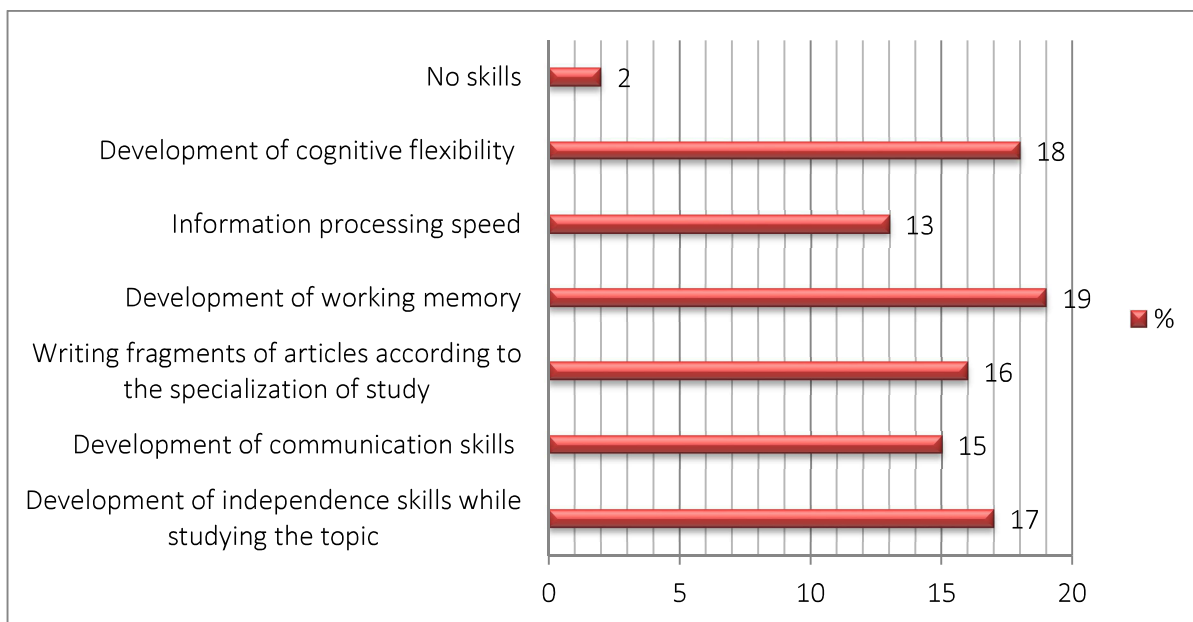
According to the Kirkpatrick Model, it was established that the application of acquired

knowledge in practice was achieved at a medium level. This is due to the fact that the use of theoretical knowledge to solve problems does not cause enough difficulties. However, the application of rules in the process of communication outside the educational institution causes difficulties.

The general knowledge test showed that the majority of students achieved a high level of knowledge as a result of interactive study of topics. Digital technologies made it possible to adapt assignments to the students' level, which promoted their development. Digital technologies have contributed to the improvement of learning efficiency due to the selection of educational applications, platforms that most closely correspond to the academic programme, students' interests.

The skills acquired by the students were determined to confirm the final effectiveness of using digital technologies for learning a foreign language (Figure 3).

Figure 3 – Skills developed by students while learning a foreign language



Source: Developed by the authors (2023).

After completing the training, working memory which is associated with memorizing a large amount of educational information, foreign words, was developed first of all. Cognitive flexibility was developed among a large number of students, which was associated with solving tasks as a result of variation with one’s own knowledge. For example, cognitive flexibility involved the use of exceptions to the rules when completing assignments. At the same time, instead of using the –ed form for a separate word, the student used its form from the table of irregular verbs.

The development of independence skills involved the possibility of studying individual topics by students, which was achieved through the use of digital technologies. This is due to the accuracy and compactness of the presentation of theoretical materials in digital applications, which was supported by relevant practical classes.

Writing fragments of articles according to the specialization of study was achieved among a smaller number of students, but also at a sufficient level. This is explained by the possibility of writing fragments of texts in which logic, structure, and selection of correct words with minimum mistakes are followed.

The development of communication skills required the availability of conversational skills

in accordance with the studied topic. A minor difficulty in the development of communication skills was the lack of “live” communication with native speakers.

The speed of processing information was developed among a smaller number of students, which is associated with the need to ensure appropriate concentration for completing assignments. The development of this skill is reflected in the possibility of increasing the productivity of students while learning a foreign language.

And only a small number of students failed to develop any skills, as they did not attend all foreign language classes because of the lack of necessary concentration.

## 5 DISCUSSION

Innovative technologies contribute to the provision of specialized foreign language learning. The study of linguistic subjects should be based on methods of translation, meaningful and integrated learning. Digital technologies contribute to the provision of developmental methods in education through dialogue, discussion, brainstorming. Digital technologies also contribute to non-standard learning in the form of a game, a separate project (Yuz-

kiv *et al.*, 2020). The use of digital technologies in the study of a foreign language allows for the classification of individual mistakes, which is reflected in their further analysis. The results showed that during the study of a foreign language, grammatical (stylistic) mistakes are observed among students, which are related to the coherence of the text. There were also problems in combining words and using prepositions (Zamborova, Klimova, 2021). Digital technologies are an important element in learning a foreign language because they are easily accessible. They also contribute to providing a game approach and identifying shortcomings during training. New technologies make it possible to reduce costs during training. Various applications also contribute to changing the way of providing information, changing visualization, which increases interest in the educational system (Balla, 2023). The analysed studies focus on the general advantages of digital technologies, which contribute to the study of a foreign language. In our work, the advantages of digital technologies were established using the example of platforms applied in education. Their ease of use, high level of assimilation of information and possibility of application for independent learning of the English language were also taken into account.

Technological strategies in learning a foreign language (English) by Yemeni students were based on providing non-formal learning. This was related to the use of social networks and websites. It was established that such an approach to education made it possible to ensure the development of reading, listening, and speaking skills, which improved the vocabulary. High results were achieved through new dimensions for rethinking approaches in foreign language learning by students (Bin-Hady, Al-Tamimi, 2021). A large number of difficulties arise during the study of a foreign language, which are associated with a significant amount of unorganized information, low students' activity. It is possible to solve this issue with the help of digital technologies. However, it is necessary to ensure that students preview educational materials before classes, that knowledge is consolidated during classes and

that it is expanded after classes. The results showed that the used approach in education will improve the quality of education (Wang, 2021). The divergent use of digital technologies is reflected in the possibility of developing a post-digital approach to learning, manifested in critical thinking. Digital technologies also contribute to flexible learning of a foreign language. The study established that achieving high results is possible due to the dynamic goals, flexibility in learning (LI and ZHU, 2017). In our work, the study of difficulties that arise during the application of digital technologies is not considered. Our study is aimed at developing a model of foreign language learning by students of non-linguistic HEIs, which subsequently allowed us to determine its effectiveness.

Special attention should be paid to verbs when learning English as a foreign language. It was established that contextual prompts did not affect students' performance. For this purpose, an individual approach to language learning should be provided, which affects the students' improved perception of the material (Pae *et al.*, 2023). The use of Blackboard Collaborate-based Instruction facilitates the study of a foreign language (English) in Saudi Arabia during distance learning. This digital platform facilitates the presentation of various university courses. The platform contributes to the provision of a flexible learning environment that allows for learning management, continuous access to learning materials, and synchronicity of learning (Khafaga, 2021; Kotenko *et al.*, 2023).

The discussion of academic articles determined that when using digital technologies in education, their advantages and disadvantages should be identified. In our work, the overall effectiveness of the use of digital technologies in foreign language learning by students of non-linguistic HEIs was determined. Digital technologies were used as part of the foreign language learning model, which involved the use of YouTube, Blackboard, Rosetta Stone, Learn English, Simpler, Memrise, Bussu. This made it possible to determine their ease of use, overall effectiveness, and the possibility

of independent study. The overall effectiveness of training was determined Also, with the help of the Kirkpatrick Model.

## 6 CONCLUSIONS

The aim of the study was achieved, which was to determine the effectiveness of learning a foreign language through the use of digital technologies. A model of foreign language learning by students of non-linguistic HEIs was developed for this purpose. The study of the theoretical material involved a division into the preparatory stage and self-learning, which was implemented using YouTube, Blackboard, and Rosetta Stone. These digital technologies enables providing visualization of theoretical material and its simpler presentation. Practical classes were conducted with the help of Learn English and Simpler programmes, which ensured individual study of a foreign language. The knowledge test involved determining students' understanding of a particular topic and involved the use of Memrise and Bussu programmes to complete assignments of various levels of complexity.

According to students, the most effective programmes for learning a foreign language are Blackboard (0.43), Learn English (0.43) and Bussu (0.44). The results are related to the grouped approaches to presenting information and completing assignments, which allows for meaningful language learning. Rosetta Stone (0.45), Learn English (0.42), Memrise (0.43) are the most favourable programmes for self-study, as they are aimed at facilitating the perception of information with the help of associations, providing individual training as a result of determining the previous level of students' knowledge.

It was established by using the Kirkpatrick Model that the vast majority of students have a positive reaction to the developed approach to learning (96%), because it is associated with the use of interactive approaches, which contributes to better memorization of information. It also affected the achievement of high results by students during the study of a foreign language (92.5).

It was found that systematic training was primarily reflected in the development of working memory (19%). This is due to the use of a large number of foreign words and rules. The learning approach influenced the development of cognitive flexibility (18%), which involved the use of a logical approach to completing particular assignments. There were no skills among 2% of students who did not complete assigned tasks and missed foreign language classes.

The practical significance of the work is the creation of a new approach to foreign language learning by students of non-linguistic HEIs as a result of combining various digital technologies. The prospects for further research include finding digital technologies that will contribute to effective online and offline learning.

## REFERENCES

- ANTUFIEVA, V.; HOLUBOVA, H.; LISOVSKA, A.; KULESHOVA, K.; ORIEKHOVA, L. Professionally-Oriented Discourse in Foreign Language Teaching in HEIs. *World Journal of English Language*, v. 13, n. 4, p. 61–67, 2023.
- BALLA, E. Impact of Technology in Acquisition of English Language. *Journal of Educational and Social Research*, v. 13, n. 1, p. 134–145, 2023.
- BIN-HADY, W. R. A.; AL-KADI, A.; HAZAEA, A.; ALI, J. K. M. Exploring the dimensions of ChatGPT in English language learning: a global perspective. *Library Hi Tech*, 2023. doi: 10.1108/LHT-05-2023-0200.
- BIN-HADY, W. R. A.; AL-TAMIMI, N. O. M. The use of technology in informal English language learning: evidence from Yemeni undergraduate students. *Learning and Teaching in Higher Education: Gulf Perspectives*, v. 17, n. 2, p. 107–120, 2021.
- GARCÍA-ALLÉN, A.; TAYLOR, S. K. Seeing innovation from different prisms: university students' and instructors' perspectives on flipping

- the Spanish language classroom. *Language Learning in Higher Education*, v. 13, n. 1, p. 105–125, 2023.
- ISHCHENKO, Y.; VDOVENKO O.; NYCH, T.; MOROZ-REKOTOVA, L.; ARYSTOVA, L. Effectiveness of distance learning in higher educational institutions under martial law. *Apuntes Universitarios*, v. 13, n. 1, p. 348–364, 2022. doi: 10.17162/au.v13i1.1332.
- KHAFAGA, A. F. The perception of blackboard collaborate-based instruction by EFL majors/teachers amid COVID-19: A case study of Saudi universities. *Journal of Language and Linguistic Studies*, v. 17, p. 1160–1173, 2021.
- KLIMOVA, B.; ZAMBOROVA, K.; CIERNIAK-EMERYCH, A.; DZIUBA, S. University Students and Their Ability to Perform Self-Regulated Online Learning Under the COVID-19 Pandemic. *Frontiers in Psychology*, v. 13, p. 781715, 2022.
- KONOTOP, O.; BYKONIA, O.; BONDAR, O.; SHEVCHENKO, YU.; KASIANCHUK, N. Practice of using GoToMeeting/Zoom in the study of foreign languages. *Journal for Educators, Teachers and Trainers*, v. 12, n. 3, 2021. <https://jett.labosfor.com/index.php/jett/article/view/557>
- KOSHARNA, N.; PETRYK, L.; SOLOMAKHA, A.; SYTNYK, O.; LOBODA, O. Digital and multimedia technologies in teaching foreign languages to students of pedagogical specialties. In: PAPADOPOULOS, I.; PAPADOPOULOU, E. (Eds.). *Pedagogical and Research Perspectives on Language Education*. Nova Science Publishers, 2023, p. 125–152.
- KOTENKO, O.; KOSHARNA, N.; CHEPURNA, M.; TREBYK, O.; BAKHOV, I. Linguistic and Stylistic Features of English Public Speeches. *World Journal of English Language*, v. 13, n. 4, p. 56–60, 2023.
- LI, M.; ZHU, W. Explaining dynamic interactions in wiki-based collaborative writing. *Language Learning and Technology*, v. 21, n. 2, p. 96–120, 2017.
- LU, J. Embracing Digital Technologies in Language Research: An Emerging Language Research Paradigm driven by Science and Technology Development. *Journal of Foreign Languages*, v. 43, n. 4, p. 2-11, 2020.
- MANN, L.; KIAER, J.; ÇAKIR, E. *Online Language Learning: Tips for Teachers*. Palgrave Macmillan Cham, 2022.
- MUNRO, M. The complicity of digital technologies in the marketization of UK higher education: exploring the implications of a critical discourse analysis of thirteen national digital teaching and learning strategies. *International Journal of Educational Technology in Higher Education*, v. 15, p. 11, 2018. doi: 10.1186/s41239-018-0093-2.
- O'KEEFFE, M.; CREHAN, M.; MUNRO, M.; LOGAN, A.; FARRELL, A. M.; CLARKE, E. ... CLINTON, E. Exploring the role of peer observation of teaching in facilitating cross-institutional professional conversations about teaching and learning. *International Journal for Academic Development*, v. 26, n. 3, p. 266–278, 2021.
- PAE, H. K.; SUN, J.; AI, H.; FALHABER, E. L. Going for-ing or-en? A Puzzle about Adjectival Principles for Learners of English. *Chinese Journal of Applied Linguistics*, v. 46, n. 1, p. 48–70, 2023.
- PARK, M.; SON, J.-B. Pre-service EFL teachers' readiness in computer-assisted language learning and teaching. *Asia Pacific Journal of Education*, v. 42, n. 2, p. 320–334, 2022.
- RETELJ, A. Development of digital competence of future teachers of German as a foreign language at the university of Ljubljana. *Folia Linguistica et Litteraria*, v. 13, n. 41, p. 139–161, 2022.
- SUN, J.; PAE, H. K.; AI, H. The recognition of coordinative compound words by learners of Chinese as a foreign language: A mixed methods study. *Foreign Language Annals*, v. 54, n. 4, p. 923-951, 2021.



TAYLOR, S. K.; MOHANTY, A. K. Challenges to implementing best practices in complex plurilingual environments: The case of South Asia. **The Routledge Handbook of Plurilingual Language Education**, n. 20-2, p. 385–393, 2021. doi: 10.4324/9781351002783-27.

THE NORWEGIAN NATIONAL COMMITTEE FOR RESEARCH ETHICS IN SCIENCE AND TECHNOLOGY. **Guidelines for Research Ethics in Science and Technology**. 2016. <https://www.forskningsetikk.no/en/guidelines/science-and-technology/guidelines-for-research-ethics-in-science-and-technology/>

WANG, T. A Blended Collaborative Teaching Mode in Language Learning Based on Recommendation Algorithm. **International Journal of Emerging Technologies in Learning**, v. 16, n. 23, p. 111–126, 2021.

YUZKIV, H. I.; IVANENKO, I. M.; MARCHENKO, N. V.; KOSHARNA, N. V.; MEDVID, N. S. Innovative methods in language disciplines during profile training implementation. **International Journal of Higher Education**, v. 9, n. 7, p. 230–242, 2020.

ZAMBOROVA, K.; KLIMOVA, B. Analyzing second language written summaries at university level. **Emerging Science Journal**, v. 5, n. 6, p. 943–952, 2021.

ZAMBOROVA, K.; KLIMOVA, B. The utilization of a reading app in business English classes in higher education. **Contemporary Educational Technology**, v. 15, n. 3, p. ep445, 2023.

ZHU, W.; QIN, X. Peer response in Chinese as a Foreign Language context: A classroom-based case study. **Electronic Journal of Foreign Language Teaching**, v. 19, n. 2, p. 191–205, 2022. doi: 10.56040/wzxq1926.

## APPENDIX A

Examples of practical assignments during the study of a foreign language with the use of digital technologies

### Assignment 1

The application presents a random image, the description of which students have to perceive by ear. An audio record was used for this purpose for the students to listen and note the inaccuracies that were made in the audio record. For example, the inconsistency of the specified colour with the colour of a separate element of the picture itself. They should also fill in the blanks (arrange the letters) to describe the picture you saw:

This man \_\_\_\_\_ young.

These dresses \_\_\_\_\_ short.

He has t \_\_\_\_\_ c \_\_\_\_\_.

etc.

### Assignment 2

In order to develop students' intercultural communication skills and eliminate psychological barriers, it was necessary to ensure speaking and listening, focusing on digital technologies. After listening to the audio record, the students should identify the differences in Ukrainian and Polish culture. It was also necessary to describe existing stereotypes and ways to eliminate them. The completion of the assignment was based on team work as a result of simulating the relevant situation. The discussion of the behaviour of different peoples is aimed at brainstorming, which contributes to better assimilation of information.

Recebido em 06 de dezembro de 2023

Aceito em 14 de março de 2024