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The role of web applications in the development of multilingual competence in CLIL courses in higher education

El papel de las aplicaciones web en el desarrollo de la competencia multilingüe en los cursos AICLE de la enseñanza superior

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Abstract

The purpose of the work is to determine the role of web technologies to ensure the formation of multilingual



competence within the CLIL approach. For this purpose, a survey was conducted among students of various specialties, however, with a special emphasis on students of technical universities. The survey was conducted among 58 students. Questionnaires were used, including questions about the use of web applications in various forms of education. The results of the survey showed the high efficiency of using web applications in CLIL courses for the formation of both language competence and subject knowledge. The CLIL method combined with modern web applications proved to be an effective tool in the students' learning process. The implementation of the program of this approach allows not only the problem of educational overload, but also the strengthening of the general development of students, including their language skills. In the conclusions, it is noted that for the successful implementation of the CLIL program, it is necessary to provide students with essential terms and to acquire a foreign language and the availability of trained teaching staff.

Key words: digital learning, language competence, content-language integrated learning, pedagogical technologies.

Resumen

El objetivo del trabajo es determinar el papel de las tecnologías web para garantizar la formación de la competencia multilingüe dentro del enfoque AICLE. Para ello, se realizó una encuesta entre estudiantes de diversas especialidades, aunque con especial énfasis en los estudiantes de universidades técnicas. La encuesta se realizó entre 58 estudiantes. Se utilizaron cuestionarios que incluían preguntas sobre el uso de aplicaciones web en diversas formas de enseñanza. Los resultados de la encuesta mostraron la gran eficacia del uso de aplicaciones web en los cursos AICLE para la formación tanto de la competencia lingüística como del conocimiento de las materias. El método AICLE combinado con modernas aplicaciones web demostró ser una herramienta eficaz en el proceso de aprendizaje de los alumnos. La aplicación del programa de este enfoque permite no sólo resolver el problema de la sobrecarga educativa, sino también reforzar el desarrollo general de los alumnos, incluidas sus competencias lingüísticas. En las conclusiones, se señala que para el éxito de la aplicación del programa AICLE, es necesario proporcionar a los estudiantes con términos esenciales y adquirir una lengua extranjera y la disponibilidad de personal docente capacitado.

Palabras clave: aprendizaje digital, competencia lingüística, aprendizaje integrado de contenidos y lenguas, tecnologías pedagógicas.

Introduction

According to the globalization trends present in modern education, multilingual competence is becoming an increasingly chief skill for students. A central part of developing these skills is the use of Content and Language Integrated Learning (CLIL), which is created to provide the opportunity to study some academic disciplines and a foreign language. For this reason, their future competitiveness in the labour market is significantly enhanced. At the same time, technologies, in particular web applications, play a particularly important role in supporting and improving CLIL courses. Various web technologies play an important role in the CLIL methodology: they provide the formation of an interactive environment for the purpose of learning content in different languages. In addition, the active use of web applications in the CLIL system helps students actively develop in the educational process, master subject knowledge and develop language. This becomes especially important for the development of multilingual competences, because various web applications offer access to authentic resources and interactive tasks.

Modern scholars who have studied various manifestations of the use of digital technologies have generally emphasized their importance in the e-learning system, recognizing their accessibility and flexibility (Iastremska et al., 2023; Byrko et al., 2022). Besides, several modern works have proved that web-based applications provide an interactive and engaging learning environment where students can immerse themselves in a technology-based language environment (Stepanenko et al., 2022; Zaitsev, 2023). They can also actively interact with teachers and collaborate on projects with their classmates. They also allow



for personalization of the learning process, taking into account the individual needs and level of knowledge of each student (Papaja, 2024). Thus, the research problem consists in determining the effectiveness of using web applications in the CLIL methodology for the purpose of developing students' multilingual competences. Moreover, the importance of web-based applications in the process of developing multilingual competence in CLIL courses in higher education is extremely important, as they contribute to the effectiveness of learning and students' readiness for the challenges of the modern multilingual world.

The purpose of this research paper is to describe the importance of web-based applications in the process of developing multilingual competence in CLIL courses in higher education. The main objectives of the study are:

1. To identify the main methods of implementing CLIL for the development of multilingual competence.
2. To characterize the main web applications and the frequency of their use in the CLIL approach.
3. To determine the impact of web applications on the formation of language skills.
4. To describe the advantages and disadvantages of using web technologies for multilingual competence development.

The content of this article consists of an introduction that presents the research problem, a theoretical framework that reviews the scientific literature and shows the scientific novelty of this study, a methodology that involved the use of a quantitative approach, and the processing of survey data. 57 students completed the survey. Also, the work consists of the results, where the role of web technologies in the system of formation of multifaceted competence is investigated using the analysis of data from surveys, a discussion where the obtained results and conclusions are compared, which emphasize the critically important role of modern interactive technologies in the system of CLIL courses.

Theoretical Framework or Literature Review

Modern integration and globalization processes prevailing in Europe and the world have led to the actualization of the issue of information exchange, search for understanding among representatives of different ethnic groups and cultures, but also led to an understanding of the importance of preserving, conserving and developing the existing linguistic and cultural heritage and cultural diversity of peoples. Researchers believe that the concept of multilingualism has a rather vague definition, which can change in accordance with the existing realities in different scientific schools (Zaitsev, 2023). In the scientific linguistic literature, where the term "multilingualism" is used, the concepts of "multilingualism" and "polylingualism" are also used simultaneously (Smala, 2022; Jiang & Leung, 2024). Establishing similarities and differences between these terms is a process that is the subject of further important debates, which, in turn, also introduce ambiguity into the interpretation of the essence of "multilingualism". According to the literature analysis, it can be determined that multilingualism is the process of using several languages in the environments of certain social communities (primarily within the borders of a country); the use of several languages by an individual (or a group of subjects), each of which can be chosen in accordance with the requirements and needs of each specific communication case.

The development of multilingual competence (the ability to master foreign languages independently) in the higher education environment thus becomes an important element of higher education, so the attention to this issue, as characterized by researchers, is indeed very high (Byrko et al., 2022; Frumkina et al., 2020; Snizhko, 2023). Among the basic principles of the formation of a modern higher education institution, the role of digitalization in the educational process is rightly noted (Khoiriyah, 2021; Phuong & Thi Nguyen, 2022). This opens up new elements of foreign language teaching and multilingual competence, which makes it possible to reassess the existing ones and introduce new educational elements.

The creation of new information and educational environments on the Internet also makes it possible to fulfill one of the important principles of education democratization - to provide access to quality linguistic education to everyone, regardless of their place of residence, other objective circumstances, etc. In



general, students should not only have an adequate level of knowledge in learning a foreign language, but also form reliable levels of competence necessary for the subsequent use of the acquired knowledge, their independent development during further education or professional activities.

The previous review of the CLIL literature generally focuses on general strategies for using language to support and process information, improve the quality of learning, and form an appropriate level of multilingual competence (Turchyn et al., 2023; Compagnoni, 2023; Hemmi & Banegas, 2021). In particular, an extended review of measures to support different strategic approaches to quality content for reading, teaching, etc. was proposed (Geoghegan, 2024). Researchers have also paid a lot of attention to strategies and methods for integrating practical recommendations to support language use across the curriculum, which is especially relevant for CLIL, using basic tools to formulate clear learning objectives (Hubina, 2017; Shevchenko & Dubiaha, 2022). The CLIL research literature also demonstrates a wide range of other strategies to support language learning, including the use of various cognitive strategies, research approaches with the use of game opportunities (Gierlinger, 2017), communication and active listening, the use of special methods for vocabulary building, participation in cultural, international and cross-curricular learning activities, etc. These approaches emphasize the innovative nature of CLIL and the methodological stimulus provided by the use of such a methodology. However, the proposed studies do not fully reveal the possibilities of pedagogical ways to help teachers and students develop and use different types of conversation, nor do they address the different linguistic cultures of different academic subjects.

Methodology

The study uses quantitative data processing methods. In particular, the features of CLIL use in higher education were assessed through a survey. The main participants of the study are students of different specialties who took part in an anonymous survey.

Sample and Participants

Students were selected for the experiment using a purposive sampling method. In total, 57 students were selected from different faculties. Participation in the survey was voluntary and based on the criterion of familiarization with the use of CLIL in higher education. All students have different experience of using web technologies in the learning process: from initial (who have just started using them) to advanced (who have been using CLIL web technologies for more than one semester). The study involved students based on the soft, language-led approach - the development of linguistic skills within a specific context (see Table 1).

Table 1.
Data of respondents

Indecator	N	%
Specialty		
Humanities	14	24,56%
Natural sciences	5	8,77%
Technical sciences	21	36,84%
Economics and management	17	29,82%
Level of education		
Bachelor (first and second year)	21	36,84%
Bachelor's degree (third and fourth years)	23	39,66%
Master's degree	14	24,56%
The level of technology use		
Beginners	17	29,82%
The average level	22	38,60%
Experienced users	18	31,58%

Source: Author's development



This demographic data shows the diversity of respondents and their different experiences with web applications. The majority of respondents were from technical fields. This is due to the fact that teaching subjects using the methodology is becoming increasingly popular in technical universities, especially for engineering majors.

Data collection

In order to collect data as part of the study of the peculiarities of using web applications in CLIL courses among students of different specialties, a survey was used as the main tool for collecting information. The main stages of data collection consisted of developing a questionnaire based on a preliminary analysis of the literature that examined the key features of using technology in education. The structure of the questionnaire itself included sections on collecting demographic characteristics, questions about the specifics of using individual web applications in CLIL courses, and outlining feedback on the advantages and disadvantages of using this approach (see Table 2).

Table 2.
Questionnaire

Questions	Answer options
Demographic data	What is your specialization? What course are you studying in? How old are you?
What web applications do your teachers use in CLIL?	Educational Google Meet Zoom Microsoft Teams Organizational and methodical Google Classroom Moodle Additional Quizlet Kahoot Padlet Trello Slack
How often do you use web applications in CLIL?	a. Every day b. Once a month c. 2-3 times a week d. 2-3 times a month
For what specific types of learning are web applications used in your institution?	a. Seminars b. Lectures c. Group projects d. Individual classes
Rate the value of individual applications for the development of your language skills (1 - negative, 5 - positive)	a. 1 b. 2 c. 3 d. 4 e. 5
Evaluate the impact of applications on understanding the subject	a. 1 b. 2 c. 3 d. 4 e. 5
Evaluate the impact of applications on learning motivation	a. 1 b. 2 c. 3

	d. 4 e. 5
What do you consider to be the best aspects of using web applications?	a. Accessibility b. Interactivity c. Convenience d. Realization of digital collaboration e. Other
What are the challenges of using web applications?	a. Technical issues b. Problems with the Internet c. Low motivation in the digital environment d. Lack of support from teachers e. Other

Source: Author' development

Certain aspects of the survey included its distribution among potential participants through the electronic systems of the educational institution (in particular, via e-mail and separate learning platforms). Students' responses were also collected within a certain period of time (February 15, 2024 - February 25, 2024), i.e. within 10 days. All survey participants are guaranteed anonymity and confidentiality of their data.

Data analysis

Data processing consisted of checking respondents' answers for completeness. After that, the answers were coded and categorized. In particular, using Excel, the main questions and their answers were entered into tables. Thus, the most common themes, advantages and problems of using web technologies in the CLIL system were found. An important method was statistical analysis, which was used to identify and define the main answers, dependencies and statistically significant differences between different groups of students. The results of the study are presented in such a way as to describe first some features of the CLIL approach, the frequency of technologies, advantages and main disadvantages of implementing web applications.

Results and Discussion

The CLIL approach is aimed at teaching a foreign language to students while they acquire specialized knowledge from the curriculum. One of the advantages of the CLIL method is that it allows you to mix one or more elements of the curriculum, which helps to solve the problem of an "overcrowded curriculum". But before putting CLIL programs into practice, there are a few key things to think about. These include: 1) the availability of trained teaching staff; 2) the requirement for cooperation between teachers of different disciplines; 3) providing students with essential terms and concepts in a foreign language; 4) the potential for changes in schedules necessary to implement a CLIL program (including the period devoted to curriculum planning).

There are several methods of incorporating CLIL into the educational process. The plot technique is predicated on fusing students' thoughts and passions with the scheduled learning topic. Students contribute to the telling of a particular tale by answering "prompts" (also known as key questions) that the teacher gives them. This approach, which incorporates innovative organizing, hypothesis selection, experience, rationalization, and work display, does not rely on textbook. The planned narrative also incorporates role-playing and dramatic components. Additionally, students research and ask inquiries to one another.

The simulation approach is used in classroom instruction through a variety of simulations that let students hone their abilities and use their expertise to figure out problems in a setting that mimics actual ones. Students might try themselves in various roles through modeling. Students have the capacity to plan strategically, collaborate with others, bargain, and convince thanks to the scenario. An easy technique for rapidly and subconsciously recording ideas, discussions, and ideas is the "Mind-Map" technique. A mind



map is a visual aid that can be used to depict a word, idea, task, picture, or other related items grouped around a main term or notion. There are three kinds of absorption in a foreign language. With the exception of conducting the instruction in a foreign language without any "discounts" based on the students' proficiency level, full immersion in a foreign language is a usual educational session in professional fields. This implies that a high level of IM competency is required of students who study certain disciplines using the full immersion technique in a foreign language.

After processing the demographic data, it was established that the majority of respondents used technologies in the CLIL course system when studying technical and economic sciences (36.84% and 28.82%, respectively). At the same time, the majority of respondents were familiar with technologies starting from the first bachelor's academic year (36.84%). These technologies are also widespread (24.56%) at the master's level. Table 3 provides more detailed demographic information about the participants.

Table 3.
Data of respondents

Indecator	N	%
Specialty		
Humanities	14	24,56%
Natural sciences	5	8,77%
Technical sciences	21	36,84%
Economics and management	17	29,82%
Level of education		
Bachelor (first and second year)	21	36,84%
Bachelor's degree (third and fourth years)	23	39,66%
Master's degree	14	24,56%
The level of technology use		
Beginners	17	29,82%
The average level	22	38,60%
Experienced users	18	31,58%
Age		
18-21 years	21	36,84%
21-23 years	23	39,66%
23-25 years	14	

Source: Author' development

In the CLIL system, an important role is played by the use of various web technologies that facilitate immersion in a foreign language environment. Among them, both learning platforms and individual applications aimed at creating assignments, tests and monitoring classes play an important role. Respondents indicated that among the learning platforms they mainly use Zoom (35), Microsoft Teams (13), and Google Meet (10). LMSs that facilitate the organization and control of learning are mainly used by Moodle (49) and Google Classroom (9). The use of various additional web-based technologies plays an important role in the CLIL-based learning management system, in particular, tools that facilitate interactive presentation of material and implementation of testing and control. In particular, an important application is Padlet, which is aimed at creating collaborative boards (12) and Trello (11), which acts as a service for organizing projects and tasks in the form of cards. Also important are applications aimed at creating interactive tasks and quizzes (Kahoot, Quizlet, and Slack). Table 4 shows in detail the respondents' answers about the main web applications used by teachers in CLIL courses.

Table 4.
Main web applications in the CLIL system

Web Applications	N	%
Educational platforms		
Zoom	35	60,34%
Microsoft Teams	13	22,41%
Google Meet	10	17,24%
LMS		
Moodle	49	84,48%
Classroom	9	15,52%
Additional Applications		
Padlet	12	20,69%
Trello	11	18,97%
Kahoot	7	12,07%
Quizlet	9	15,52%
Slack	11	18,97%

Source: Author's development

Table 4 shows a variety of applications used by teachers to develop the multilingual competence of modern students. Despite this, the frequency of their use is mostly every day (23) or 2-3 times a week (26). This indicates that teachers actively use these applications based on interactive multimedia technologies, which not only improves language competence but also ensures that students are more motivated and interested in learning (see Table 5).

Table 5.
Frequency of using web technologies in the CLIL system

Frequency	N	%
Every day	23	39,66%
2-3 times a week	26	44,83%
2-3 times a month	7	12,07%
Once a month	2	3,45%

Source: Author's development

Besides, given the demographic data of the participants, teaching subjects using the CLIL methodology is becoming increasingly popular in technical universities, especially for engineering specialties. In terms of implementing this approach in the system of technical universities, CLIL has a number of features and advantages. In particular, engineering courses often contain a lot of specialized terminology. Teaching such courses in a foreign language helps students to master professional vocabulary, which is extremely important for their future careers, especially in international companies. Laboratory and practical classes are also an important part of engineering education. For this reason, teaching such classes in a foreign language helps students not only to understand the material, but also to learn how to describe processes, experiment results, and draw conclusions in the language used in the international scientific and engineering community.

In the CLIL system, modern web applications are used to conduct various types of training, lectures, seminars, group or individual projects, assignments to monitor results and for testing purposes. In particular, 25 answers mentioned lectures, 31 and 35 answers mentioned seminars and group classes, respectively. Another 26 indicated individual classes and seminars, respectively. The largest number of responses (43) indicated the use of these applications for interactive control tasks. Completing various learning projects and preparing presentations in a foreign language develops students' communication skills, teamwork skills, and ability to succeed in an international digital environment (See Table 6).

Table 6.
Types of educational activities

Types of educational activities	N	%
Lectures	25	43,10%
Seminars	31	53,45%
Group projects	35	60,34%
Individual classes	26	44,83%
Testing	43	74,14%

Source: Author's development.

Besides, the use of web-based applications is important for the development of language skills. Modern platforms are designed in such a way that they can develop both speaking and writing skills through activities aimed at listening, communication, grammar and vocabulary development. Students recognized that there is a connection between the use of modern web applications and the development of language skills. The majority of respondents rated this impact at 4 and 5 points on the Likert scale (34.48% and 55.17%, respectively). It was also determined that web applications also affect the understanding of the subject (5 points - 10 students or 17.24%, 4 points - 39 students or 67.24%, and 3 points - 10 people or 13.79%) and increase motivation to learn (5 points - 32 students - 55.17%, 4 points - 14 students - 24.14%, - 3 points - 11 - 18.97%), as evidenced by the respondents' scores (see Figure 1).

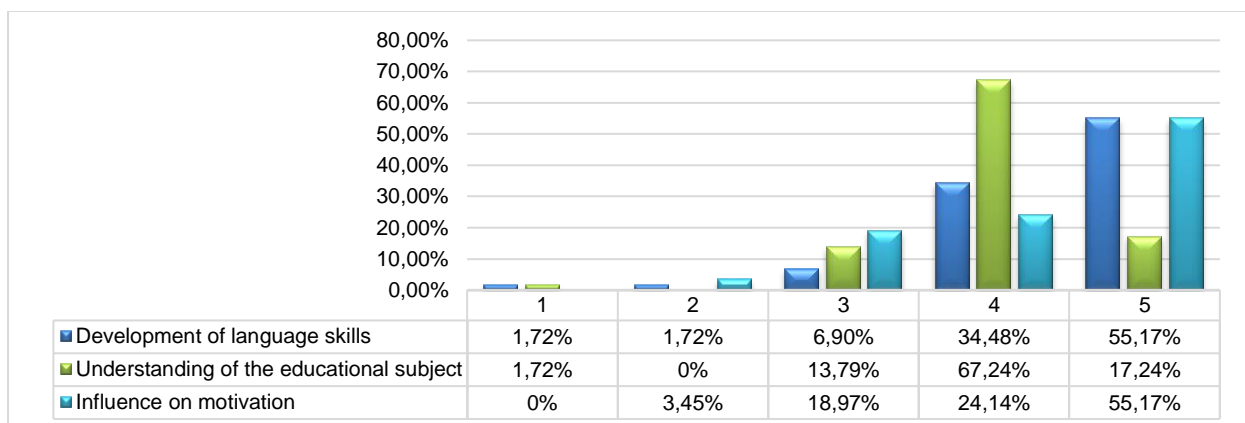


Figure 1. The impact of web technologies on the development of language skills, subject knowledge and motivation to learn.

Source: Author's development

The advantages of using web technologies in the development of multilingual competence are quite obvious. First of all, we are talking about the possibility of open access to all resources that serve as reliable tools for forming the necessary knowledge and achieving the desired learning goals. The aspects of convenience and accessibility were emphasized by 44.83% of respondents. Secondly, digital technologies regularly and continuously facilitate learning, improve language skills, communication and intellectual exchange. In addition, in addition to the purely pedagogical load, digital technologies have a powerful gaming segment for teaching, which is considered a powerful advantage in modern world pedagogical experience. The aspect of interactivity and the implementation of joint digital activities was emphasized by 39.66% and almost 16% of respondents.

Modern digital capabilities of technologies, such as augmented reality, allow visualizing educational content, showing video clips, animations, etc. Moreover, these functions can be performed using mobile applications, which make digitalization an even more accessible element of education. Given that the largest number of participants study at technical universities are majoring in engineering. Teaching various engineering disciplines in a foreign language helps to improve language competence, increase specific

labor marketability, and develop critical thinking. In particular, knowledge of foreign languages and specialized terminology makes graduates more attractive to international companies.

However, there are some challenges in creating a digitalized learning space using special web applications. In particular, technical issues (24.14%) and low motivation to learn in a digital environment (18.97%) are notable. However, the most common problem is the lack of the Internet access (48.28%). Also, 5 respondents emphasized that an important difficulty is the lack of effective support from teachers (8.62%). Thus, the use of web-based applications is effective in some aspects but requires support from both the training center (high level of technology) and the teacher (high level of pedagogical and linguistic competence).

The proposed results generally demonstrate the high efficiency of the use of digital tools in the integration of CLIL into the educational process in Ukrainian higher education institutions. The positive impact of digitalization (in particular, the use of applications) on the formation and development of multilingual competence was noted in the survey. The proposed results indicate that the use of Zoom, Microsoft Teams and Google Meet learning platforms is popular, which correlates with the findings of other researchers (Patiño-Santos & Poveda, 2022). Similarly, the proposed results determine that the use of various additional web technologies plays an important role in the system of organizing learning based on the CLIL approach. Similar conclusions were reached by other researchers who emphasized the relevance of modern applications as elements of learning and improving multilingual competence in CLIL courses (Popadynets & Staryk, 2022; Nawrot-Lis, 2021). Researchers have drawn attention to the problematic elements of using CLIL in teaching and developing relevant competencies. In particular, attention was drawn to the lack of motivation during learning and the lack of appropriate training among teachers, which slows down the further dynamic development of the use of digital technologies (Verikaitė-Gaigalienė & Andziulienė, 2019; Cinganotto, 2016; Denman et al., 2022; Pérez Cañado, 2018).

The proposed results allow us to argue with such conclusions. The point is that teachers, according to the survey, use various applications mostly every day or 2-3 times a week. On the one hand, this shows the frequency of digital technologies, and on the other hand, it indicates high skills of teachers in digital technologies (since without the appropriate skills, the use of the necessary applications is impossible). Therefore, the results are more in favor of other conclusions: the ease of use of digital technologies allows teachers to quickly learn new methods (Burns & García, 2024). Teachers are actively using these applications based on interactive multimedia technologies, which not only improves language competencies but also ensures that students are more motivated and interested in learning (Martínez Agudo, 2019). The results also demonstrate that the use of web-based applications contributes to the development of language skills. This confirms the findings of other researchers who have emphasized that modern digital platforms generally function as multidisciplinary elements, which allows for a comprehensive approach to learning and the formation of relevant multilingual competencies (San Isidro & Lasagabaster, 2020). In particular, a study and comparison with the Swedish experience of CLIL implementation also confirms this conclusion (Paulsrud, 2018). Undoubtedly, the further introduction of digital applications into the process of higher education in the field of foreign language acquisition is an objective requirement of our time (Rudenko & Kharkov, 2023). For this reason, further research will significantly expand the process of understanding the role of digitalization in the formation of multilingual competence.

The results of this study correlate with the study by Yevtushenko (2021), which characterizes the features of CLIL implementation in the system of training students of technical specialties. The researcher also drew attention to both the broad possibilities of this approach and some shortcomings. However, this study has shown that the main challenges are technical issues, problems with the Internet, and a low level of motivation to learn in a digital environment. In some cases, there is a lack of effective support from teachers. However, the study by Yevtushenko (2021) identified a number of other problems, including the experimental nature of some CLIL programs, the need for a high level of language competence of subject teachers, lack of qualified teacher training, etc. The authors of this article also agree with these problems, and moreover, a connection can be made between the lack of effective support from teachers (as



demonstrated in this study) and the lack of qualified teacher training for CLIL implementation (as demonstrated in Yevtushenko (2021)). The proposed methodology, however, has certain limitations. In particular, the survey demonstrates specific empirical results, but the peculiarities of using the Likert scale have a role in understanding the results. First of all, the difference between average, good, and poor on the Likert scale is quite subjective: what may be mediocre for one respondent is still close to a higher level (though not excellent) for another. In such circumstances, it is possible to correlate the statistical indicators of the study, to understand the results as certain markers rather than just a number. The Likert scale may not take into account the circumstances in which students work or study in higher education institutions, the level of material and technical resources, the level of teaching skills, or the level of knowledge of students. All of this may have a minor impact on the overall values of the empirical data. For comparison, we chose relevant English-language literature, which allowed us to discuss the proposed results qualitatively. The use of such a sample for scientific literature somewhat limits the use of foreign-language publications, which may also have rational thoughts on the development of CLIL in the context of digitalization of higher education. This factor makes it possible to determine that the issue will require further discussion with the involvement of a wider range of scientific literature, using new, improved criteria for selecting research texts.

Conclusions

Thus, in the CLIL didactic approach, modern web applications play an important role in the development of multilingual competence. They make learning more accessible, convenient and interactive for modern students. For technical specialties, this approach is especially important, as it develops knowledge of specific terminology that may not have analogues or equivalents in the student's native language and the skills to use it. The CLIL system actively uses modern web applications to conduct various types of training, such as lectures, seminars, group and individual projects, as well as to monitor results and conduct tests. One of the key advantages of the CLIL method is the ability to integrate several elements of the curriculum, which helps to solve the problem of an "overcrowded curriculum". Implementation of CLIL requires trained teaching staffs that have both subject knowledge and a high level of foreign language proficiency. This requires organizing special trainings for teachers.

Thus, the CLIL methodology is a promising direction, however, for its wider implementation it is necessary to follow the recommendations: 1. Increasing attention to teacher training, in particular, providing teachers with the necessary resources and training for effective teaching of CLIL; 2. Creating quality learning resources that meet the requirements for implementing this didactic approach; 3. Providing quality technical support, in particular, quality access to modern web applications that support the learning process.

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