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Использование технологии CLIL при формировании иноязычных лексико-грамматических навыков студентов в цифровой образовательной среде

Введение. В условиях поликультурного и полилингвального общества невозможно представить современного человека, не владеющего иностранным языком и не способного интегрировать знания языка в структуру своей деятельности. Проблема применения технологии CLIL с использованием цифровых технологий в обучении иностранным языкам представляется одним из перспективных направлений современной лингводидактики и обусловлена концептуальными идеями модернизации системы образования. Цель исследования заключается в апробации предметно-языкового интегрированного обучения при формировании лексико-грамматических навыков студентов на немецком языке в цифровой образовательной среде.

Материалы и методы. В качестве цифрового инструментария для составления комплекса упражнений использовались Quizizz, Wordwall, Learning Apps, MyQuiz (для тестов и интерактивных заданий), Gamilab (для квест-игры), Boris Bot (для создания чат-бота), Podomatic (для подкастов). В педагогическом эксперименте приняли участие 55 студентов 5 курса Казанского (Приволжского) федерального университета (Российская Федерация), обучающихся по направлению подготовки «Педагогическое образование (с двумя профилями подготовки)» (бакалавриат). Статистическая обработка данных контрольной и экспериментальной групп проводилась по критерию хи-квадрата Пирсона.

Результаты исследования. При формировании лексико-грамматических навыков с интеграцией технологии CLIL соблюдались следующие этапы: введение или презентация нового материала, тренировка, речевая практика и рефлексия. Для каждого из этих этапов подобран цифровой инструментарий, позволяющий создать интерактивные тесты, игры, веб-квесты на основе конструкторов и сервисов для обучающихся. Поэтапная методика формирования лексико-грамматических навыков с использованием CLIL в цифровой образовательной среде доказала эффективность в развитии следующих умений: группировать лексику по семантическому принципу, переводить с русского языка на немецкий, описывать иллюстрации, опираясь на отработанный лексико-грамматический материал, в письменной и устной форме представлять результат выполненной проектной работы. Эффективность методики формирования лексико-грамматических навыков с применением предметно-языкового интегрированного обучения в цифровой образовательной среде подтверждается педагогическим экспериментом, проведенным со студентами вуза (χ²эмп. = 7,30, p<0,05).

Выводы. Полученные результаты могут быть использованы в преподавании немецкого языка в вузе, на старшем этапе обучения в средних общеобразовательных школах с углубленным изучением немецкого языка, гимназиях и лицеях. Разработанная учебно-методическая технология внедрения интегрированного предметно-языкового обучения может стать основой для создания учебного пособия. Результаты исследования вносят вклад в развитие цифровой лингводидактики, комплекс разработанных заданий может стать стимулом для более интенсивного применения технологии CLIL при обучении иностранному языку.

Ключевые слова: предметно-языковое интегрированное обучение, технология CLIL, цифровая образовательная среда, лексико-грамматический навык, немецкий язык

The application of the CLIL technology in the development of foreign language lexical and grammatical skills of students in digital educational environment

Introduction. In a multicultural and multilingual society, it is hardly possible to find a modern person who does not speak any foreign language and is not able to integrate his language knowledge into the structure of his activity. The concept of applying CLIL digital technology in a foreign language teaching seems to be one of the promising areas of modern linguodidactics and is due to the conceptual ideas of modernizing the system of education. The purpose of the study is to verify the subject-language integrated learning in the formation of lexical and grammatical skills of students of German in a digital educational environment.

Materials and methods. Quizizz, Wordwall, Learning Apps, MyQuiz (for tests and interactive tasks), Gamilab (for quest games), Boris Bot (for creating a chat bot), Podomatic (for podcasts) have been used as digital tools for compiling a set of exercises. 55 fifth year students of Kazan (Volga Region) Federal University, the major is “Teacher training (a double-degree programme)” (bachelor degree course), have been selected to attend the pedagogical experiment. Statistical processing of the samples of the control and experimental groups has been carried out according of the Pearson’s chi-squared test.

Study results. The following steps were observed in the process of lexico-grammatical skills formation with the integration of CLIL technology: introduction or presentation of new course content, training, speech practice and reflection. For each of these stages, a digital toolkit has been selected which enabled us to create interactive tests, games, web quests based on design kits and services for students. A step-by-step methodology for the formation of lexical and grammatical skills using CLIL in a digital educational environment has proven effective in developing the following skills: to group vocabulary semantically, to translate from Russian into German, to describe illustrations, based on the trained lexical and grammatical content, to present the result of the completed project work in written and oral form. The effectiveness of the methodology for the formation of lexical and grammatical skills using subject-language integrated learning in digital educational environment has been confirmed by a pedagogical experiment conducted with the university students’ participation ($\chi^2_{emp.}=7,30$, $p<0,05$).

Conclusions. The results obtained can be applied in German language teaching, in upper-secondary and high schools with advanced curriculum in German, grammar schools and lyceums. The developed educational and methodological technology for the implementation of integrated subject-language training can become the basis for creating a study guide. The results of the study contribute to the development of digital linguodidactics; the set of developed tasks can become an incentive for more intensive application of CLIL technology in a foreign language teaching.

Keywords: subject-language integrated learning, CLIL technology, digital educational environment, lexical and grammatical skill, the German language

For Reference:
One of the main objectives of the language education policy of the Council of Europe is to promote plurilingualism, which implies the development of the communicative abilities of students to communicate in several languages, including a foreign one, in accordance with their needs. The programme of the European Center for Languages "Education in the study of foreign languages" defines a language as an important means of learning, which involves not only learning a foreign language, but also teaching various subjects in it. Educational institutions must be open to new concepts and methods in order for a future specialist to develop expertise related to intercultural communication and business interaction in a foreign language in their professional field for a two-way exchange of experience and knowledge. One of such technologies which contributes to the formation of a foreign language professional and communicative skill is the Content-Language Integrated Learning (CLIL) technology.

The implementation of subject-language integrated learning is regarded of particular importance, since, on the one hand, it allows to increase the efficiency of teaching a foreign language, and, on the other hand, to expand and deepen the mastered professional content through authentic data in a foreign language. The integration of CLIL technology through digital technologies enables to improve the quality of teaching materials for higher education, which will contribute to the achievement of one of the national 2030 development goals of the Russian Federation, i.e. to rank the Russian Federation as one of the leading countries in the world in terms of the education provided [1].

According to the Global Declaration adopted in 2021, one of the key provisions is the digital transformation of education, which specifically involves the introduction of a hybrid form of education combining full-time and online forms of education [2]. Applying learning resources efficiently, one can operate a number of didactic tasks in the classroom more effectively: for instance, to develop reading skills applying network materials of various difficulty modes; improve listening skills with Internet authentic audio texts; develop the skills of monologue and dialogic utterance in the course of critical thinking discussion of web materials; replenish the vocabulary with profile-oriented vocabulary on the chosen topic; develop sociolinguistic competence, which includes the knowledge of speech etiquette, the context of business communication, cultural traits and traditions of the target-language country [3].

A large number of published works by foreign and domestic researchers testify to the relevance and heightened interest in subject-language integrated learning [4]. Scaffolding learning support strategies are a means of activating the process of foreign language training using CLIL technology; cooperation between teachers of a foreign language and a subject area (mathematics, ecology, biology, etc.) is the key to successful integration of CLIL [5]. M. E. Porcedda argues that the use of multimedia tools is an integral part of the subject-language integrated learning [6]. The work of L. Cinganotto provides a successful and important world experience of online teacher training, which allows us to note the close relationship between CLIL and CALL (Computer-Assisted Language Learning) [7]. According to the results of the experiment obtained by X. San Isidro, teachers believe that the CLIL technology enables them to create a good basis for the development of pluriliteracy and emphasize the need for
methodological training of the teaching staff of educational institutions [8]. L.P. Khalyapina analyzes the reasons for the slow integration of subject-language integrated education in Russian universities [9]. The design of the course content applying CLIL technology, tools and methods for assessing student progress, recommendations for retraining teachers are disclosed in the work of A. Alipichev [10]. The study of K.S. Grigorieva is devoted to the formation of foreign language competence of professional communication based on CLIL technology among students of a technical university [11]. The works that summarize the results of using CLIL in the context of elementary school are also presented [12].

Foreign researchers of subject-language integrated learning have found that the basis for the integration of a foreign language and subject content is a combination of four components (4C): content, communication, cognition, culture [13, p. 67]. These four elements are interrelated and should be reflected in every integrated session. As the authors point out, the advantages of CLIL technology include the immersion of students in a wider cultural context, aptitude for further professional activities in a foreign language, increased competitiveness and motivation for self-realization and achievement of high results in professional activities. Its key points, namely, authenticity, multitasking, active learning, safe learning environment, learning support, contribute to high performance in education [14; 15]. V.P. Sysoev distinguishes 6 stages in the development of educational materials using CLIL technology, starting with determining the content of subject-specific modules and finishing with the development of professional orientation tasks [16]. Depending on the goals of training, one of two models of CLIL technology can be used: soft or strong. The soft model focuses on the study of a foreign language based on the single module of any academic subject area, while the strong model focuses on the whole content of the subject and is characterized as a partial language immersion [17, p. 105-106].

V.P. Sysoev cites the approaches of Russian universities to the training of teaching staff for integrated courses, analyzes the experience of the Derzhavin Tambov State University and concludes that with individual and targeted work it is possible to train specialists who are ready to conduct classes in specialized subjects in a foreign language [18]. The studies devoted to the problems of evaluating design work in a subject-language integrated course are of particular importance [19]. A.V. Kudryashova emphasizes that, it is necessary to improve the mechanism of interaction between teachers of foreign languages and specialized subjects for the successful implementation of the CLIL approach [20]. The works of O.O. Zakharova and R. Zaripova reflect the principles and methods of using digital tools and platforms with a subject-language integrated approach to create a game situation, organize collaborative work and visualize educational materials [21; 22].

The purpose of the study is to develop and verify the effectiveness of the implementation of CLIL technology in the development of lexical and grammatical skills in German classes in a digital educational environment.

MATERIALS AND METHODS

The following methods were used to achieve the goal and solve the problems: scientific and methodological literature analysis on CLIL technology introduction in the development of lexical and grammatical skills, research of the basic concepts "subject-
language integrated learning" and "lexical-grammatical skill"; survey and diagnostic method (testing); pedagogical modeling, development of a set of exercises in the German language; pedagogical experiment, method of mathematical statistics. Data processing was carried out using the StatTech service [23] and Microsoft Office Excel.

The experimental work was carried out on the basis of the Institute of Philology and Intercultural Communication of Kazan Federal University in the 2021 and 2022 academic years as part of the academic discipline "Speech practice of a second foreign language". It was attended by 55 fifth year students of Kazan (Volga Region) Federal University, the major is "Teacher training (a double-degree program)" (bachelor degree course), profile "Foreign (English) language and second foreign language".

The experimental work was carried out to study the issue of the development of lexical and grammatical skills in the German language classes using the CLIL technology in digital educational environment. The experimental group consisted of 26 students, the control group of 29 students. The level of students' knowledge of the German language is Intermediate – Upper-Intermediate.

CONTENT PREPARATION APPLYING DIGITAL TECHNOLOGIES FOR EXPERIMENTAL LEARNING

According to the concept of V.E. Zhigadlo, the stages of introducing CLIL technology in teaching the German language, as well as the digital tools to achieve the goals were identified (table 1) [24].

<table>
<thead>
<tr>
<th>Work stages</th>
<th>Digital tools</th>
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<tbody>
<tr>
<td>Installation</td>
<td>Brainstorming with Mentimeter</td>
</tr>
<tr>
<td>Presentation</td>
<td>Introduction of new content, clarifying challenges with Learning Apps, Wordwall, MyQuizz, Quizizz, presentations</td>
</tr>
<tr>
<td>Analytical</td>
<td>application of the acquired knowledge conducting experiment, application of chatbot Boris Bot, podcast launch in Podomatic</td>
</tr>
<tr>
<td>Reflective</td>
<td>testing and feedback with Gamilab, Liveworksheets</td>
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The staged introduction of CLIL technology using digital tools enables a teacher to succeed in language skills development and introduce authentic material on the given topics effectively.

1. At the installation and presentation stages, to involve students in the discussion of the module, they need to be engaged and motivated to learn, which is achieved via an interactive game created on the Learning Apps platform, in which students match pictures with the suitable vocabulary (fig. 1). It not only sparkles their interest but also clarifies lexical challenges that may arise when performing further tasks. For more convenience, one can use the QR code: one need to scan the code with the camera, and the game will be loaded and displayed on the screen automatically.
2. Practicing grammar skills on the topics “Passiv”, “Zweiseilige Konnektoren” takes place with the help of interactive tasks on the Wordwall platform (fig. 2).

3. The analytical stage is presented by a chatbot (www.borisbot.com website) which provides various tasks for the video, praises the participants and supports them. (fig. 3).
At the initial stage, students are greeted by the bot that informs them that they will need to watch a video on the topic of environmental protection. The bot asks for the name of the student in order to address them by name in the future; thus the communication with the chat bot becomes more confiding. The work with any video material consists of three stages, which are taken into account in this task: pre-viewing activities, while-viewing activities and post-viewing activities. In the pre-viewing stage the chatbot helps to clarify challenges that may arise while watching. Each word or phrase is accompanied by a picture for clarity and better memorization. New words should be written down in vocabulary notebooks / flash cards. After learning new vocabulary, the chatbot gives a mini-quiz to check the learned words (fig. 3).

At the second stage, the number of possible views is not limited, the video can also be stopped anytime so that everyone works at their own pace. During the viewing the chatbot poses questions about the content of the video in order to check whether the students comprehend it (fig. 5).
As the last task, students are offered questions on the content of the video with a free answer. The chatbot also provides the video again if the student missed the information needed in the response.

4. Subject-language integrated learning involves the development of cognitive-thinking, creative skills of students; therefore, groupwork is integrated in the process of researching the topic, in order to conduct experiments, with the help of which not only lexical and grammatical data is worked out, but there is an immersion in the content of the subject, which is a characteristic feature of this technology.

The proposed experiment does not cause any specific difficulties in its implementation. To conduct it you need: 2 ice cubes, 2 plates and 1 glass. Students place the ice cubes on the plates and cover one of them with the glass. After that they record the time required for each of the cubes to melt. During the experiment, they make the necessary notes, and then formulate the conclusion. Using the background knowledge and their critical thinking, students note their hypothesis about why the cube covered with the glass melts faster. Thus, due to the experiment, their motivation to study this topic is boosted, they understand that they can apply lexical and grammatical knowledge not only in theory, but also put into practice, and thus it has a positive impact on further immersion into the theme.

5. Language learning includes different web projects that contribute to the development of all types of speech activity and research skills. For instance, the purpose of the web project is to record a podcast on the topic "Environmental situation in my city". The structure of the podcast is outlined and the points appropriate for the podcast text preparation are brainstormed. At this stage, all lexical and grammatical challenges that arise in the preparation of the podcast text are clarified. This project not only attracts students by its extraordinary format, but also enables them to apply unrestrictedly all the lexical-grammatical knowledge acquired during the study of the “Environment” module. The advantage is that students can comment on each other’s podcasts and provide feedback. This forms a respectful attitude towards each other and the ability to embrace various points of view. In addition, a podcast recording on this topic fosters love for nature, hometown and cultivates respect for resources.

6. The gamification of the educational process allows working out current issues and problems of sustainable development in a game format and developing environmental
awareness. The quest game held at the reflective stage was created on Gamilab service, which is based on the H5P platform and allows you to prepare resourceful content with HTML5. The game consists of 13 stations, each includes different tasks; step by step students move towards the goal, answering questions. For instance, one of the tasks is to explain the term "sustainable development"; the examples and goals of sustainable development are given. The task is presented in the form of an interactive video, which integrates questions and exercises aided to comprehend the main content of the text (fig. 6).

![Figure 6 A task from an interactive video integrated into a quest game](image)

Through the inclusion of templates, the game becomes fun, station passage imitation is created, automatic answer check keeps students motivated to complete the tasks, receive instant feedback and can increase their insight into the environmental issues.

**STUDY RESULTS**

The pedagogical research was based on the experimental work, which consisted of three stages: ascertaining, formative and control. During the ascertaining stage, the OnSet level test was conducted in electronic format to determine the level of students’ German language proficiency. During the formative stage, the students of the control group were trained according to the traditional method. In the experimental group, in addition to traditional materials, a set of tasks was introduced, created on the basis of the application of CLIL technology in the digital environment. The pedagogical experiment was carried out on the basis of the soft CLIL model, since the main focus was put on learning a foreign language studying the module "Environmental Protection".

At the control stage of the pedagogical experiment, a test was conducted for the final student assessment in terms of the level of development of lexical and grammatical knowledge in the control and experimental groups.

Based on the data obtained, we can conclude that the above mentioned level of development of lexical and grammatical skills was higher in the experimental group. For clarity and analysis of the development dynamics, we present the results in Table 2.
Table 2

<table>
<thead>
<tr>
<th>Formative experiment</th>
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<th>Average</th>
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<tr>
<td></td>
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<td>Control group</td>
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<td>before experiment</td>
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<td>4</td>
<td>15,38</td>
<td>9</td>
<td>31,03</td>
<td>9</td>
<td>34,62</td>
<td>17</td>
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<tr>
<td>after experiment</td>
<td>3</td>
<td>10,34</td>
<td>8</td>
<td>30,77</td>
<td>11</td>
<td>37,93</td>
<td>13</td>
<td>50</td>
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</table>

Statistical processing of the control and experimental group samples has been carried out according to the Pearson's chi-squared test at a significance level of 0.05, and the following hypotheses have been advanced:

Hypothesis H0: the difference in the results of task accomplishment by students does not depend on the teaching method.

Hypothesis H1: the difference in the results of task accomplishment by students is not conditioned by random factors, but by the targeted development of lexical and grammatical skills applying CLIL technology.

The critical tabular value of the Pearson's chi-squared test is 5.99. Statistical processing of the obtained results using the Chi-square test showed that $\chi^2_{\text{emp}} > \chi^2_{\text{crit}}$ ($7,30 > 5,59$). Therefore, the differences between the frequency distributions of the two groups are statistically significant at the $p<0.05$ significance level. Thus, an alternative hypothesis is accepted that the differences in the level of formation of students' lexical and grammatical skills can not be conditioned by random factors. Based on this, the conclusion follows that the experiment has confirmed the effectiveness of the use of CLIL technology in the development of lexical and grammatical skills.

DISCUSSION

The developed set of tasks and exercises applying CLIL technology including digital tools has contributed to the formation of both lexical and grammatical skills, and to introduction of the students into the environmental issues and their causes; it has enabled them to describe the environmental situation in their hometown based on the questions provided; to converse on their personal contribution to environmental protection. Particular focus was set to the development of the following students’ skills: listening to authentic texts with basic comprehension of the main content / with complete comprehension of the content (dialogue); reading texts of various genres (informative texts, literary texts, dialogues, magazine articles) with basic comprehension content / with a quest for given information / with full comprehension of the content; pre-reading prediction of the content of the text based its title and illustrations; illustration description; storytelling based on a series of pictures with keywords; preparation and conduct of interviews based on question words; formulation of the gist of the audio dialogue; opinion-giving on environmental issues. It is also viewed as significant to develop students' compensatory skills – the ability to rely on illustrations, linguistic and contextual guesses, as well as on the translation of individual words in the process of reading an authentic text. Considerable attention was given to the development of creative abilities of students in the course of the project. In the process
of experimental training video and audio materials, interactive tasks were applied, which enabled the students to present the result of the completed project work in writing and orally and provide personal contribution to environmental protection.

The students of the experimental group have noted that the application of CLIL technology in the formation of lexical and grammatical skills in learning the German language increases the motivation for learning and helps to boost their knowledge of the German language. The participants in the experimental group actively completed the tasks they received, eagerly conducted experiments, met the deadline in handing in their homework and interacted with each other. With the participants of the control group, such tasks with the introduction of CLIL technology were not carried out, so the level of formation of lexical and grammatical skills has not significantly increased in these groups.

The works of A.V. Danilov, R. Zaripova complement the results of the study and confirm the effectiveness of content-language integrated learning using digital and multimedia technologies [25; 26]. Simultaneous dual orientation of the learning process (professional and linguistic), i.e. a foreign language is integrated with the subject content of the academic discipline, and the natural learning of a foreign language in the process of professional communication can improve the level of lexical and grammatical skills development of students. A similar opinion is expressed by other researchers who have identified the advantages of using this technology [27; 28].

As a rule, when introducing CLIL technology, a small amount of time is spared on grammar, since the basic emphasis is put on the content aspect. But since in this work we focused on a soft model, which primarily assesses the knowledge of the language, the teacher can devote sufficient time to the grammatical data. This is mainly achieved by the inductive method of the explicit approach, since in the process of using CLIL technology, it is significant that students themselves strive to broaden their horizons. The advantage of this technology is also the fact that of the three key stages of teaching grammar, namely, introduction stage, training exercises and speaking, the latter given a sufficient amount of time. The learners participate in the discussion of the content component and practice both lexical and grammatical material provided as additional. The rapid introduction of a lexical unit into speech is the peculiar feature of the development of a lexical skill: almost immediately after the introduction of a new lexical item, students enjoy the opportunity to use it in their oral and / or written speech.

According to the results of the survey, the students of the experimental group were mostly engaged in such tasks as conducting experiments, watching thematic videos, and doing exercises in interactive games. The majority of the surveyed students have noted that the preparation, recording of the podcast and subsequent peer assessment developed the skills of the foreign language oral speech. Many students have pointed out that taking a web quest as a test is more effective and causes less psychological stress and discomfort than traditional test-taking. Summarizing the results of the reflective survey, we can conclude that the students were quite comfortable working in the digital educational environment, despite minor technical difficulties, such as the unstable internet connection, the interaction with the Gamilab and Boris Bot platforms.

As a result of a comparative analysis of testing, the following results were obtained. The number of students with a high level of proficiency in lexical and grammatical skills has reached 26% in the experimental group and 10% in the control group, the number of students with an average level has increased to 50% and 37% respectively, with a low level it has decreased to 23% in the experimental group and 51% in the control group.
CONCLUSION

The results of the study have proved that the developed and tested model for the implementation of CLIL technology with the help of a digital educational environment is able to increase the level of lexical and grammatical skills of students in the chosen module. In the field of education interactive technologies create fundamentally new opportunities for organizing the educational process, become the intellectual core of the informatization of modern society, determine the ways and means of delivering information, take into account the individual psychophysiological characteristics of students, help to save learning time resources, focus mainly on the content aspect of educational activities, provide visualization of modeling of various processes in the study of theoretical and practical material and thereby contribute to the improvement of the quality of activity-based learning. The most productive forms of organization of educational and cognitive activity of students are learning in cooperation and in a group. Activation of students' cognitive activity is facilitated by experiments in the German language classes. When teaching German, it is advisable to use CLIL technology as support for the traditional learning process of students.

The results of the study can be applied in modeling the educational activities of teaching a foreign language with the introduction of CLIL technology, in the system of advanced training and retraining of foreign language teachers and serve as the basis for creating teaching guides on the implementation of integrated subject-language teaching.

REFERENCES