



DOI: 10.54919/physics/56.2024.80edj7

Implementation of content and language integrated learning in biology education programs

Aigerim Tuktassinova*

Sarsen Amanzholov East Kazakhstan University
070020, 34 30 Gvardeiskoi Divisii Str., Ust-Kamenogorsk, Republic of Kazakhstan

Kulzhakhan Bakirova

Abai Kazakh National Pedagogical University
050010, 13 Dostyk Str., Almaty, Republic of Kazakhstan

Almash Kitapbayeva

Sarsen Amanzholov East Kazakhstan University
070020, 34 30 Gvardeiskoi Divisii Str., Ust-Kamenogorsk, Republic of Kazakhstan

Anargul Sharipkhanova

Sarsen Amanzholov East Kazakhstan University
070020, 34 30 Gvardeiskoi Divisii Str., Ust-Kamenogorsk, Republic of Kazakhstan

Zhamal Igissinova

Sarsen Amanzholov East Kazakhstan University
070020, 34 30 Gvardeiskoi Divisii Str., Ust-Kamenogorsk, Republic of Kazakhstan

Abstract

Relevance. Modern higher education emphasizes not only professional training but also the integration of students into the global professional community through foreign language proficiency, which enhances skills and professional competence.

Purpose. This research aims to assess the effectiveness of Content and Language Integrated Learning (CLIL) methodology in biological education programmes at higher education institutions in Kazakhstan.

Methodology. A semi-formalized questionnaire survey was conducted across six educational institutions in Kazakhstan, comprising "closed" questions including open-ended list questions, single-choice questions using the Likert scale, and multiple-choice questions, totalling 16 questions.

Results. The survey conducted across six educational institutions in Kazakhstan revealed that 85.5% of students perceive Content and Language Integrated Learning (CLIL) positively contributes to their English language acquisition within biological education programmes. This underscores CLIL's effectiveness in enhancing language skills alongside disciplinary knowledge. Despite varying English proficiency levels among participants, the study indicated strong student engagement with CLIL, demonstrating significant interest and active participation in the learning process.

Conclusions. The study confirms CLIL's efficacy in enhancing English acquisition within Kazakhstan's biological education. With 85.5% of students noting its positive impact, CLIL shows promise as a key method for integrating language and disciplinary knowledge. Despite varying English levels, high student engagement underscores CLIL's

Suggested Citation:

Tuktassinova A, Bakirova K, Kitapbayeva A, Sharipkhanova A, Igissinova Zh. Implementation of content and language integrated learning in biology education programs. *Sci Herald Uzhhorod Univ Ser Phys.* 2024;(56):807-816. DOI: 10.54919/physics/56.2024.80edj7

*Corresponding author



Copyright © The Author(s). This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (<https://creativecommons.org/licenses/by/4.0/>)

effectiveness. Future steps should focus on formalizing CLIL across Kazakhstan, providing support for educators, and refining methodologies through ongoing research. Implementing CLIL prepares students for global contexts, enhancing educational outcomes and international competitiveness.

Keywords: English; pedagogy; teaching methodology; linguistics.

Introduction

Introducing content and language-integrated learning (CLIL) is a hot topic in modern education. Every year the quality of learning in higher education institutions is becoming increasingly dependent on the future specialist's proficiency in English and the ability to use this type of communication to find professional information and interact with foreign colleagues. It can potentially improve the quality and efficiency of education in biology, reduce the workload of students and teachers, and enhance the skills of young professionals, all of which have a positive economic impact [1]. The technique is used widely in Europe and the United States because of its significant advantages over traditional teaching methods. CLIL can increase students' motivation to learn a language by providing them with real-life situations of language use in the context of a specific topic, which allows them to better understand the importance of language in their lives. Likewise, this methodology allows students to better understand and remember the content of the subject as they learn it in a language they can use in everyday life [2].

A study conducted by F. Fitrawati et al. [3] found a high interest in the learning process in a group of CLIL students as well as this group showed an increase in critical thinking skills and communication skills. This may help students learn better and prepare better for exams [4]. Thus, in an article by T. Roth et al. [5] a correlation was found between the implementation of this technology and the improvement of the quality of the acquired knowledge both in the main subject of study and in the linguistic area, an increase in cognitive skills was also noted. In addition, the application of this technique contributes to the development of cross-curricular skills in students, competencies that are necessary in different fields of activity and can be applied in different situations. They are key skills needed to succeed in career and personal life.

These skills include communication, which involves the ability to analyse complex situations, identify the causes of problems, and find effective solutions. Critical thinking is also essential, enabling the analysis of information, drawing conclusions, and making informed decisions based on logic and evidence. Additionally, time management is crucial, involving the ability to plan and organize one's time to achieve goals. Teamwork is another vital skill, requiring the ability to work with others, considering their strengths and weaknesses, to achieve a common goal [6].

Content and language integrated learning is a teaching method in which students learn the subject not only in biology lessons but also in language lessons. For example, instead of learning new words and terms separately from the curriculum, pupils learn them in the context of the biological topic they are learning in class. This helps pupils to better understand the topic and to link new knowledge to what they already know. This way of teaching is extremely effective in the students' language acquisition compared to conventional curricula [7]. It has also shown

other benefits, such as increasing the time of language learning, using additional sources of information, facilitating learners' interaction with foreign sources, and improving communication between students, which also has a beneficial effect on language learning [8].

The benefits of introducing CLIL into biology education programmes:

1. Improving the quality of education: CLIL allows students to gain a deeper understanding of biological concepts and terms so that they remember them better and can apply them in their activities. This leads to a better quality of education and improved student performance. A.R. Artino Jr. et al. [9] found that CLIL learners were more likely to use their acquired language skills in practice and were more likely to search for additional content on core subjects from foreign sources, thus promoting early integration of this group of learners into the world of modern science.

2. Reduced workload for students and teachers: CLIL reduces the amount of additional language and biology lessons that are usually required to learn new terms and concepts. It also allows teachers to use class time more efficiently as they can combine language and biology lessons into one lesson.

3. Development of communicative skills: CLIL allows students to develop their communication and communication skills in English, using new terms and concepts from the field of biology. This is important because in today's world knowledge of English is a prerequisite for a successful career in science, as L.A. Silva [10] confirms.

4. Preparing for international exams: CLIL also helps students prepare for international exams such as TOEFL or IELTS, which require knowledge not only of the language but also of specialised biology terms and concepts [4]. N. Yokono [11] studied the impact of this teaching technique in a simulated international language examination in English, and it was found that the writing and speaking scores were significantly higher in the main group than in the control group. In addition, the international language certificate will allow for costly specialised refresher courses at no cost and participation in international conferences, allowing for the integration of the experience of colleagues from other countries in various scientific and technical sectors in Kazakhstan.

The introduction of CLIL in biology education programmes has several limitations and challenges. One of the main problems is the lack of qualified teachers able to provide effective CLIL. There may also be difficulties in accommodating different levels of language proficiency of students and different biological topics [12]. Currently, there are no studies examining the problem of introduction and implementation of CLIL in higher education institutions in Kazakhstan, nor are there data on the qualifications of teachers responsible for teaching this methodology, although these factors are some of the main factors in the success of this technology of the educational

process. Overall, CLIL in biology education programmes is a relevant and important topic in modern education. It improves the quality of education, reduces the workload of students and teachers, develops communication skills, and prepares students for international examinations. For this approach to be successful, enough qualified teachers need to be provided and consideration needs to be given to pupils' backgrounds and different biological topics.

The research aims to assess the success of the use of CLIL in higher education institutions in Kazakhstan using the example of biology education programmes and to formulate conclusions based on a questionnaire study of a target group of biology students studying this methodology. The study will help to clearly articulate the main advantages and disadvantages of this type of learning and will describe the main ways of solving the problems encountered, using the experience of using CLIL in the European Union, Japan, Iran, and the United States of America.

Materials and Methods

Instruments

The process of implementing content and language-integrated learning, the use of learning materials, as well as the factors facilitating and hindering CLIL education based on biological education programmes, were studied employing a semi-formalised survey of students undergoing this methodology. The researchers to obtain the required information used a semi-formalised questionnaire created by the authors themselves. A thorough analysis of the sources revealed that modern questionnaires are not suitable for this type of research, which was the reason for the formation of a questionnaire that fully meets the information requirements of this article. This paper followed the basic criteria of questionnaire creation, according to the international criteria for the creation of this type of questionnaire [9], which included three preparatory steps in the form of planning, formation, and validation. The first step was to identify the target group of students, the second step was to identify the objectives of the survey and the main information categories, and the third step was to test the methodology on a small number of students in the target group to determine its effectiveness.

The questionnaire included two sections: a socio-demographic section consisting of 6 items and a main section to study the impact of integrated object-language learning on the English level of the study group. The total number of questions in the questionnaire was 16, of which 6 constituted the socio-demographic block and 10 the main block. The socio-demographic block was aimed at collecting information about the respondents: age, place and course of study, educational programme, and level of English language proficiency. The main block focused on the implementation of CLIL, namely the quality of teaching, the use of the target language and mother tongue, teaching materials and other resources, and factors facilitating or hindering learning in the target language.

Respondents also selected recommendations that promoted meaningful and linguistic integration of learning. The survey was uploaded to the Google Forms service in two languages: Kazakh and Russian. The link to the questionnaire with a QR code was sent to the official email addresses of higher education institutions in the Republic of Kazakhstan. The questionnaire included "closed" questions (questions with ready answers), which were presented in the following way: open-ended questions; single choice questions based on the Likert scale (1 – Strongly disagree; 2 – Disagree; 3 – Neutral; 4 – Agree; and 5 – Strongly Agree); multiple choice questions.

Preparatory phase, information collection and data analysis

Before the study began, once the questionnaire had been generated, it was translated into Kazakh to maximise the coverage of the target group and to improve the quality of the data conducted directly by the authors of the study. The questionnaire was then disseminated on the internet and the official pages of the higher education institutions. 146 students from 6 universities in the Republic of Kazakhstan participated in the survey, including Sarsen Amanzholov East Kazakhstan University, Shakarim University, Pavlodar Pedagogical University, K. Zhubanov Aktobe Regional University, Kazakh National Woman's Teacher Training University, Sirdariya University. Table 1 shows the number of respondents.

Table 1. Participant number

No.	Higher education institution	Participant number	Respondent percentage
1	Sarsen Amanzholov East Kazakhstan University	12	8.3%
2	Shakarim University	3	2.1%
3	Pavlodar Pedagogical University	6	4.1%
4	K. Zhubanov Aktobe Regional University	98	67.6%
5	Kazakh National Woman's Teacher Training University	22	15.2%
6	Sirdariya University	4	2.8%

An empirical method was used in the research, namely a survey and questionnaire survey to investigate the impact of CLIL use on foreign language acquisition performance. The study involved the completion of questionnaires by the target group who were learning English using CLIL, without the use of in-depth statistical analysis, concluding

solely on the results of the questionnaires. The respondents include students in years 1-4 of the following educational programmes: 6B01505-Biology (pedagogical direction), 6B05101-Biology (scientific direction), 6B01512-Biology-Natural Science, 6B01511-Chemistry-Biology.

Results

Based on the data obtained from the socio-demographic block, students aged 17 to 24 took this test. A significant proportion of the participants were students aged 19 to 20, making up 61% of the total. The distribution for the remaining age groups was as follows: 23.4% were aged 17 to 18, 13.5% were aged 21 to 22, and the 22 to 24-year-old group accounted for 2.1%. Students from year 1 to 4 participated in the survey: graduates of biology education programmes accounted for 36.1%, year 3 – 34.7%, year 2 – 26.4%, and year 1 – 2.8%. Traditionally, CLIL has been used in upper secondary schools and higher education institutions where students are already proficient enough to understand foreign language materials and participate in discussions in English. However, recent research has shown that the use of the CLIL technique can also be effective in the lower grades.

For example, the study conducted in Kazakhstan by I. Olkova and N. Sytnikova [13] will be taken. This study investigated the impact of the implementation of CLIL supplementary materials in the teaching of foreign language to a group of primary school students, where after the first stages a higher vocabulary was observed in the study group than in the control group. In such cases, it is important that teachers are prepared to use the method and can adjust the level of difficulty of the materials to the age and language level of their students. Thus, the age for using the CLIL methodology may vary, depending on the specific educational needs and capacities of the institution. D. Nilsson and S. Lundqvist [14] examined the impact of CLIL on the development of communicative skills in servicepersons receiving English language training using this methodology, where the average age of the respondents was over 30 years old. In the end, it was found that the effectiveness of this mode of instruction was low in the study group, although all participants noted an improvement in their conversational skills.

CLIL is a flexible approach that can be applied to a wide range of subjects, including science, history, geography, mathematics, and biology. The key is to

integrate language learning with content learning in a way that is relevant and meaningful to the students. In this way, students can develop their language skills while gaining knowledge and understanding of the core subject, but the complexity of the programme makes a tangible contribution to the integration of this type of learning [15]. Most of the respondents 77.4% are students in the education programme 6B01505 Biology (pedagogical direction).

The second largest group of surveyed students represents the following educational program in biology: 18.2% – 6B05101-Biology (science direction). Moreover, students in 6B01512-Biology-Science – 2.9%, and 6B01511-Chemistry-Biology – 1.5%, represent a smaller proportion. The participation of students from different educational programmes in the survey can be both positive and negative, depending on the objectives of the survey and the nature of the study. If the purpose of the survey is to obtain general information about students' opinions and experiences on a particular topic, the participation of students from different educational programmes may be beneficial, as it will provide a broader perspective and diversity of opinions.

However, if the survey is being conducted to assess the effectiveness of a particular programme or teaching methodology, it is better to survey only the students who are studying the programme in question. This will provide more accurate and reliable results, as students from different programmes may have different experiences and knowledge that may affect their success in learning a foreign language, as example, science students have a more challenging programme of study than a pedagogical one. It should also be considered that if students with different backgrounds participate in the survey, it should be ensured that the questions and wording are clear and understandable for all survey participants to obtain objective and comparable results. A distribution of proficiency levels was carried out, the results of which are shown in Figure 1.

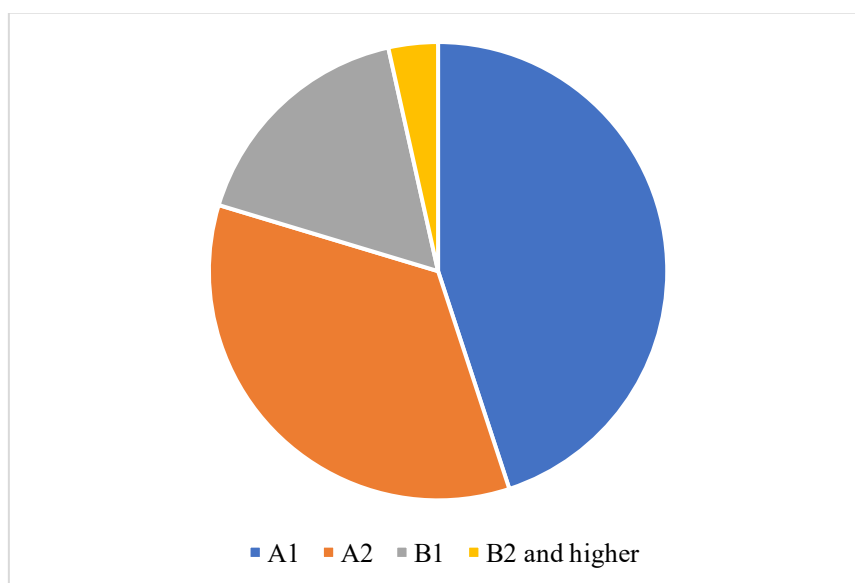


Figure 1. Distribution by the level of English language proficiency, %

It is important to note that among the students with Upper-Intermediate level, only 2.8% have the International English Language Testing System (IELTS), Test of English as a Foreign Language (TOEFL) and other language examinations. Following the main unit only 34.5% of respondents are completely satisfied with the lessons, both with the additional language practice and without complaints about their quality. 49.7% of respondents are satisfied only with the availability of

additional language practice, but the quality of English teaching, in their opinion, is unsatisfactory. Only 8.3% have a negative opinion about both the process of teaching and the number of extra hours of language practice in this method. 7.6% of the participants found it difficult to answer this question. The effectiveness of learning English was also investigated (Figure 2).

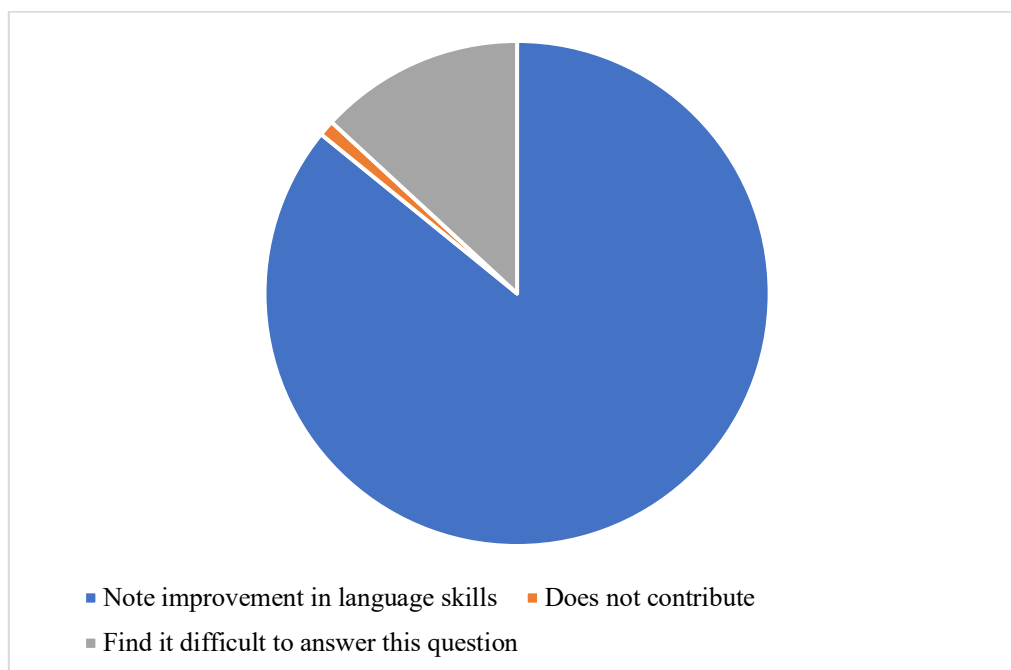


Figure 2. Categorisation by education efficiency

Nevertheless, 79.3% of the surveyed students confirm that language courses are needed in addition to learning English. 8.3% of the respondents did not need these courses and 12.4% found it difficult to answer this question. These results could be related to the fact that most respondents have a low level of English, for whom any language practice is necessary, whereas, for students with even an intermediate level of training, high-quality teaching and a lot of supplementary material are needed.

M. Jafarigohar et al. [16] observed an increase in language proficiency in students who were taught using the CLIL methodology. It was also found that average active vocabulary was lower in the conventional general education group, while CLIL students were more active in putting new words into practice. Positive feedback can be helpful, but it should not be relied upon entirely when questioning the effectiveness of the CLIL technique. It is important to bear in mind that feedback can be subjective and depends on many factors, such as the experience of the teacher, the characteristics of the learners. Therefore, to get a more objective picture, a more comprehensive analysis of the effectiveness of the methodology should be undertaken.

The students' answers to the questions on the use of teacher-prepared materials and specialised materials for CLIL show that most of the students do not always use them. Only 46.5% of the respondents use the materials prepared by the teacher always and 35.9% very often.

15.5% of the respondents sometimes refer to the teacher-prepared materials but only 0.7% and 1.4% rarely and never use them respectively. However, almost half of the surveyed students (44.1%) sometimes use specialised materials such as CLILs. Only 19.3% of students use such materials regularly, while 6.9% hardly use them and 13.1% never use specialised CLIL materials. The use of the mother tongue when applying the CLIL methodology may be necessary to facilitate the understanding and absorption of new material, especially for those students who have limited knowledge of the language of instruction.

However, when using the CLIL methodology, it is the integration of language and content that is the goal and therefore the maximum use of the language of instruction should be sought so that students can immerse themselves in the language environment as much as possible and put their learning into practice. This may indicate that students are not always sufficiently motivated to actively use CLIL for their learning purposes. For example, students may feel insecure in their use of English and be afraid to make mistakes, which may lead to unsatisfactory learning outcomes. In addition, specialised CLIL materials may be less accessible than traditional resources, which may also affect their use. Therefore, the use of the mother tongue should be limited and used only when it is necessary for a deeper understanding of the material. Contextual translation techniques can also be used, where the teacher provides a short translation of some complex concepts or

phrases for students to better understand the content of the lesson in the language of instruction.

Regarding the effectiveness of resources in learning English, most of the students, surveyed (50.3%) considered that audio and video materials were the most effective. 47.6% of students also mentioned glossaries and dictionaries as effective resources. 37.2% of the students use adapted texts to improve their language skills, and 35.2% believe that the teacher's explanations are effective in learning English. It is also noted that 27.6% of students use foreign literature and internet sources when learning English. It can be concluded that students mostly consider audio and video materials as the most effective resources for learning English.

They also appreciate the use of glossaries and dictionaries, adapted texts, and teacher explanations. Interestingly, foreign literature and Internet sources are used by only 27.6% of students, despite their availability and abundance on the educational resource market. Overall, the results of the survey indicate that students appreciate the diversity of resources when learning English and prefer a combination of different types of materials for effective learning. Most factors that contribute to successful learning in English are related to improved language skills (66.2%) and the ability to use foreign literature and internet sources (35.9%). Increased motivation and self-confidence also had an impact on learning (35.9%), and 24.8% of students indicated that they also noticed an improvement in their motivation.

From the survey conducted on the factors contributing to learning in English, the main factor was found to be the improvement of language skills, noted by 66.2% of the students surveyed. Two other factors also received an equal number of responses: the opportunity to use foreign literature and Internet sources, and increased motivation and self-confidence, with a score of 35.9%. It is noted that 24.8% of students noted an increase in motivation and self-confidence, and 17.2% chose academic mobility or internships in foreign universities. Preparation for the international language exam was chosen by 15.2% of respondents. From this, it can be concluded that improving language skills is the most important factor, but also the opportunity to use foreign literature and internet sources is important, as well as increasing motivation and self-confidence to learn English more effectively. Academic mobility or internships in foreign universities and preparation for an international language exam can also have a positive impact on the process of learning English.

These student survey results on the implementation of CLIL in biology programmes indicate the need for additional research with in-depth statistical analysis to accurately determine the effectiveness of this technique. The study notes that CLIL can be an effective tool for enhancing students' knowledge of the biological sciences and developing their language skills, but concrete results depend on several factors, including the level of teacher training, the availability of resources and the degree of cultural and educational adaptation. The research highlights the need for further research to determine how effective CLIL is for teaching biology at the tertiary level.

Discussion

Although this methodology is not new and is now used throughout the European Union, there are several issues for the educational institution that should be addressed before introducing this type of teaching. The first issue to consider is the choice of a suitable model for the implementation of CLIL. Different models can be adapted to the specific needs of learners and the institution. Some models, for example, may focus on the development of language skills, while others focus on the development of subject knowledge. Y.Y. Lo et al. [17] compared these types of approaches to implementing CLIL and found that emphasizing the linguistic component was the best option. This approach enables better mastery of the integrated language and encourages students to independently learn additional material related to the topics covered in class. In contrast, the subject-oriented approach reduced motivation and resulted in lower linguistic skills compared to the linguistic approach.

The second aspect is mastering the new teaching methodology. CLIL requires teachers to have knowledge not only of the language but also of the learning subject area. Teachers need to be prepared to integrate language and content into the learning process, to create lessons that use not only the language but also the content aspects of the subject matter. Communication skills also need to be improved. Teachers should understand that CLIL aims to develop learners' language and content skills. They should also be prepared to work following CLIL principles such as using authentic materials and creating communication situations in the language of the subject area. L.P. Seguí [18] studied the effectiveness of integrated content-language instruction with different levels of teacher training, it was determined that teachers who had taken additional courses in this methodology had better results than those without training. The CLIL methodology depends directly on the teachers, as it involves the use of content and language components equally in the learning process. The qualifications and competencies of teachers are key factors for the successful implementation of the CLIL methodology. Teachers must have sufficient knowledge and skills in the subject area they teach and must be proficient in the language of instruction [19-21].

Teachers should be involved in the creation and development of learning materials for the implementation of the CLIL methodology. It is in their competence to create materials that correspond to the content of the subject and the requirements of the language component and to have the skills to plan and organise lessons that are in line with the CLIL methodology. They should be able to integrate the language component into the learning process and ensure that the content and language components are consistent [22-24]. They also must be able to influence the development of the student's language skills. Moreover, they need to know how to create communication situations in the language of the subject area and help learners to develop their communication skills in that language. Lastly, professionals should be able to assess and monitor learners' progress within the CLIL methodology. Therefore, one of the main conditions for implementing this curriculum is a readiness to work with learners of different levels of language and learning competencies and to ensure their successful learning [25-27].

The third aspect to consider is the selection of appropriate materials and resources. The materials should be designed with the learning objectives and needs of the learners in mind. They must therefore be interesting and comprehensible and should contain language material that is appropriate to the level of learners' knowledge. G. Tashmatova [28] points out that teachers need to prepare their material for each lesson since all modern methods of implementing CLIL are built on the teacher's ability to present basic information while including the language component of learning. G. Omarbekova [29] noted the low motivation of teachers in the top 5 educational institutions in Kazakhstan to study additional materials or to get additional specialisation. Only 36% have training in this method, and only 80% of them use it in practice, which explains the low effectiveness of the integration of this teaching method in Kazakhstan. A good example of the effect of preparing specific materials for a study is the research by I. Olkova and N. Sytnikova [13] about the use of graphic organizers in lessons using this method, the implementation of which increased the average student's achievement score by 20%.

Finally, an equally important aspect is the evaluation of the results. Evaluation should be based on clear criteria and should aim at measuring progress in language and subject knowledge. Furthermore, it should be objective and fair and should be used to further improve the methodology. Overall, the implementation of the CLIL methodology can be very effective in developing students' language and subject knowledge. However, to achieve this goal, all the above-mentioned aspects need to be considered, and an implementation plan needs to be developed that meets the specific needs of learners and the institution [30-32].

Many studies note the positive impact of CLIL on the development of communication skills, critical thinking, and intelligence in general [33; 34]. For example, P. Namsaeng [35] in her study noted significant progress in students' critical thinking with this technique. CLIL promotes critical thinking because students are forced to analyse and evaluate information in a foreign language. They learn to apply their language skills to understand the material and express their thoughts [36; 37].

D. Bayram et al. [38] compared the English vocabulary of CLIL and general education students. The students in the study group had 20% more vocabulary than the general education students, and it was also found that the CLIL students performed better on tasks related to foreign language use in vocational activities. P. Jiang et al [6] studied the development of cross-curricular skills in CLIL students. The study group showed a significant advantage over the control group in terms of greater vocabulary, the development of a variety of cross-curricular skills, better teacher-student interaction, and better emotional intelligence by the end of the research.

B. Nawrot-Lis [8] indicated that the use of CLIL has many pluses for both learners and teachers it ensures more time spent on learning the target language, encourages natural communication in the target language, expands the range of functions and uses of the language, promotes interaction, makes communication more meaningful. The educational and pedagogical benefits support an integrated approach to language learning, increase teachers' motivation, improve teaching methods, enhance learning

skills, and stimulate intrinsic motivation for teacher-student interaction.

A meta-analysis by I. Cimermanova [39] also investigated the effectiveness of CLIL in preparing for international examinations. It was found that this training was more effective in preparing for international examinations in foreign language writing and increasing vocabulary, while speech perception and communication skills were not statistically different in the control group and the CLIL group. In another meta-analysis conducted by S.A. Ostovar-Namaghi, and S. Nakhaee [40] a positive effect on the correct use of grammar and punctuation in the CLIL students' group was found. Likewise, it was observed that the effectiveness of this technique is maximally effective at an early age, whereas its use in higher education institutions has no statistically significant effect on the improvement of foreign language proficiency. Based on the above-mentioned studies, CLIL is the method of choice in teaching young professionals a foreign language, which allows them to learn a foreign language together with the subject of study.

Conclusions

Following the data presented, most of the students surveyed have a low level of English (A1 and A2). This significantly affects the effectiveness of the training programme. Students with a basic level of English find it difficult to use additional materials. Additionally, it creates an extra burden on teachers, as they must spend more time preparing simplified materials for this group of learners. Based on the questionnaire it can be concluded that CLIL is highly effective in teaching English in biology education programmes. It can also be understood that most of the students do not always use the materials prepared by the teacher, this might indicate the need to involve students more actively in the use of specialised CLIL materials and to raise their awareness of this approach to learning.

It is worth noting that traditional learning resources are more effective for students than specialised CLIL materials. This may be caused by the fact that traditional resources are more familiar to students and more widely available to them than CLIL learning materials. One possible solution to this problem could be to integrate the method more deeply into the learning process. For example, teachers could be more careful in selecting specific CLIL materials so that they are more interesting and relevant for students. Interactive teaching methods such as group projects, discussions, and debates can also be used to allow students to be more involved in the learning process. Furthermore, to enhance the use of CLIL in Kazakh higher education institutions, specific training for teachers on teaching methods in English and the use of CLIL in the teaching process can be beneficial. It is also important to ensure that students have access to enough quality materials in English, such as textbooks, articles, videos, and audio materials.

Despite some shortcomings and challenges, CLIL usage in this study showed great potential to improve the quality of education in English and to train skilled professionals in different fields of knowledge. Considering that positive feedback was received from the study group despite the lack of necessary conditions for using this teaching method, it is recommended to continue studying

its effectiveness. Other methods of teaching effectiveness assessment and statistical analysis should be used. If reliable positive results are obtained, this methodology can eventually be introduced in all educational institutions in Kazakhstan.

Acknowledgements

None.

Conflict of Interest

None.

References

- [1] Hemmi C, Banegas DL. CLIL: An overview. In: International Perspectives on CLIL. Cham: Palgrave Macmillan; 2021. p. 1-20.
- [2] De Smet A, Mettwie L, Hiligsmann P, Galand B, Van Mensel L. Does CLIL shape language attitudes and motivation? Interactions with target languages and instruction levels. *Inter J Bilin Educ Bilin*. 2019;22(8):534-553.
- [3] Fitrawati F, Syarif H, Zaim M, Perrodin DD. The perceptions of tertiary students and lecturers regarding CLIL-based critical reading material employing interactive multimedia. *Ind J App Ling*. 2022;12(3):598-611.
- [4] Loranc-Paszylk B. Integrating reading and writing into the context of CLIL classroom: Some practical solutions. *Inter CLIL Res J*. 2009;1(2):47-53.
- [5] Roth T, Conradt C, Bogner FX. The relevance of school self-concept and creativity for CLIL outreach learning. *Stud Educ Eval*. 2022;73:101153.
- [6] Jiang P, Akhter S, Azizi Z, Gheisari A, Kumar T. Exploring the role of content and language integrated learning approach in developing transversal skills in university students with respect to the mediating role of emotional intelligence. *Front Psych*. 2022;13. Available from: <https://doi.org/10.3389/fpsyg.2022.988494>
- [7] Feddermann M, Möller J, Baumert J. Effects of CLIL on second language learning: Disentangling selection, preparation, and CLIL-effects. *Learn Instr*. 2021;74:101459.
- [8] Nawrot-Lis B. The effectiveness of CLIL: Overview of the field. In: The Challenges of Content Acquisition in a CLIL Course. Stuttgart: J.B. Metzler; 2019. p. 21-39.
- [9] Artino Jr AR, La Rochelle JS, Dezee KJ, Gehlbach H. Developing questionnaires for educational research: AMEE Guide No. 87. *Med Teach*. 2014;36(6):463-474.
- [10] Silva L. A. Gamification and CLIL: Development communication skills in L2 with the aid of digital tools in the bilingual context. In: Anais Estendidos do XXI Simpósio Brasileiro de Jogos e Entretenimento Digital. Porto Alegre: SBC; 2022. p. 1076-1080.
- [11] Yokono N. The effects of L1 use in CLIL on the syntactic complexity in L2 academic paragraph writing. *J Jap CLIL Ped Assoc*. 2022;4:144-156.
- [12] Bukabayeva B, Kemelbekova ZA, Erzhanova GA. Forming and developing CLIL-teacher's competences. *Bul KazNPU. Ser Ped Sci*. 2021;3(71):38-45.
- [13] Olkova I, Sytnikova N. Graphic organizers in CLIL lessons as a way to activate cognitive processes. *Bul Kaz Nat Wom Teach Train Univ*. 2021;1:124-135.
- [14] Nilsson D, Lundqvist S. Identifying weaknesses of CLIL in the military higher education classroom. *J Teach Eng Spec Acad Purp*. 2022;10(2):217-243.
- [15] Hussain SS. Content and language integrated learning (CLIL) in ELT as a link between language learning and content development. *Arab Wor Eng J (AWEJ)*. 2022;13(2):386-400.
- [16] Jafarigohar M, Divsar H, Etemad P. The effect of CLIL context on the primary education EFL receptive and productive lexical growth. *Lang Teach Res*; 2022. Available from: <https://doi.org/10.1177/13621688221078997>
- [17] Lo YY, Lui WM, Wong M. Scaffolding for cognitive and linguistic challenges in CLIL science assessments. *J Immer Cont-Bas Lang Educ*. 2019;7(2):289-314.
- [18] Segui LP. Qualitative meta-analysis on the training needs reported by in-service CLIL teachers. *Span J App Ling*. 2019;32(1):277-303.
- [19] Ivanova I, Serdyuk M, Malkina V, Tonkha O, Tsyz O, Mazur B, Shkinder-Barmina A, Herasko T, Havryliuk O. Cultivar features of polyphenolic compounds and ascorbic acid accumulation in the cherry fruits (*Prunus cerasus* L.) in the Southern Steppe of Ukraine. *Agro Res*. 2022;20(3):588-602.
- [20] Deryaev AR. Features of forecasting abnormally high reservoir pressures when drilling wells in the areas of Southwestern Turkmenistan. *SOCAR Proceed*. 2023;2023:7-12.
- [21] Sydorets V, Korzhyk V, Khaskin V, Babych O, Bondarenko O. Electrical characteristics of the equipment for the hybrid plasma-MIG welding. In: *58th Annual International Scientific Conference on Power and Electrical Engineering of Riga Technical University, RTUCON 2017 (pp. 1-6)*; 2017.
- [22] Floqi T, Shumka S, Malollari I, Vezi D, Shabani L. Environment and sustainable development of the Prespa park. *J Environ Protect Eco*. 2009;10(1):163-175.
- [23] Khalbekova HU. Amino acid composition of species of the genus *Atriplex* L. growing in the Aral Sea (Uzbekistan). *E3S Web Conf*. 2023;411:02063.
- [24] Kvasnytskyi V, Korzhyk V, Kvasnytskyi V, Mialnitsa H, Dong C, Pryadko T, Kurdyumov GV, Matviienko M, Buturlia Y. Designing brazing filler metal for heat-resistant alloys based on ni3al intermetallide. *East-Eur J Enter Tech*. 2020;6(12):6-19.

- [25] Banegas DL, Will GG. "Challenging, but not impossible": Student-teachers' views of CLIL. *Argen J App Ling*. 2022;10(2):51-60.
- [26] Kirkimbayeva Z, Lozowicka B, Biyashev K, Sarsembaeva N, Kuzembekova G, Paritova A. Leptospirosis in cattle from markets of Almaty province, Kazakhstan. *Bull Vet Inst Pul*. 2015;59(1):29-35.
- [27] Deryaev AR. Forecast of the future prospects of drilling ultra-deep wells in difficult mining and geological conditions of Western Turkmenistan. *SOCAR Proceed*. 2023;2023:13-21.
- [28] Tashmatova G. Challenges of implementing CLIL (content and language integrated learning). *Web Scien: Inter Scien Res J*. 2022;3(3):567-574.
- [29] Omarbekova G. Implementation of content and language integrated learning (CLIL) at the university level. *Ling For*. 2020;2(1):10-18.
- [30] Kuznetsov BN, Chesnokov NV, Mikova NM, Zaikovskii VI, Drozdov VA, Savos'kin MV, Yaroshenko AM, Lyubchik SB. Texture and catalytic properties of palladium supported on thermally expanded natural graphite. *React Kinet Catal Lett*. 2003;80(2):345-350.
- [31] Shuka L, Çullaj A, Shumka S, Miho A, Duka S, Bachofen R. The Spatial and Temporal Variability of Limnological Properties of Bovilla Reservoir (Albania). *Wat Res Manag*. 2011;25(12):3027-3039.
- [32] Paton BE, Chernets AV, Marinsky GS, Korzhik VN, Petrov VS. Prospects of using plasma technologies for disposal and recycling of medical and other hazardous waste. Part 2. *Probl Spetsial Electrometall*. 2005;(4):46-54.
- [33] del Mar Gálvez Gómez M. The effects of CLIL on FL learning: A longitudinal study. In: *Content and Language Integrated Learning in Monolingual Settings*. Cham: Springer Cham; 2021. p. 141-165.
- [34] Tikhonova LP, Goba VE, Kovtun MF, Tarasenko YuA, Khavryuchenko VD, Lyubchik SB, Boiko AN. Sorption of metal ions from multicomponent aqueous solutions by activated carbons produced from waste. *Russ J Appl Chem*. 2008;81(8):1348-1355.
- [35] Namsaeng P. The potential of CLIL for promoting critical thinking skills in Thailand. *Hum Soc Sci*. 2022;39(1):182-206.
- [36] Fernández-Sanjurjo J, Fernández-Costales A, Miguel Arias Blanco J. Analysing students' content-learning in science in CLIL vs. non-CLIL programmes: Empirical evidence from Spain. *Inter J Bilin Educ Bilin*. 2019;22(6):661-674.
- [37] Ichshanova A, Taubaev U, Absatirov G, Kirkimbaeva Z, Radojicic B. Carrier state of pasteurellosis in saiga antelopes in the western Kazakhstan region. *Ind Vet J*. 2018;95(8):17-18.
- [38] Bayram D, Öztürk RÖ, Atay D. Reading comprehension and vocabulary size of CLIL and non-CLIL students: A comparative study. *Lang Teach Educ Res*. 2019;2(2):101-113.
- [39] Cimermanova I. Meta-analysis of studies on the acquisition of receptive skills and vocabulary in CLIL. *J Lang Cult Educ*. 2020;8(1):30-52.
- [40] Ostovar-Namaghi SA, Nakhaee S. The effect of CLIL on language skills and components: A meta-analysis. *Iran J App Ling*. 2019;22(1):109-144.

Реалізація змістового та мовного інтегрованого навчання в освітніх програмах з біології

Айгерім Туктасінова

Східно-Казахстанський університет імені С. Аманжолова
070020, вул. 30-ї Гвардійської дивізії, 34, м. Усть-Каменогорськ, Республіка Казахстан

Кулжахан Бакірова

Казахський національний педагогічний університет імені Абая
050010, вул. Достик, 13, м. Алмати, Республіка Казахстан

Алмаш Кітапбасва

Східно-Казахстанський університет імені С. Аманжолова
070020, вул. 30-ї Гвардійської дивізії, 34, м. Усть-Каменогорськ, Республіка Казахстан

Анаркуль Шаріпханова

Східно-Казахстанський університет імені С. Аманжолова
070020, вул. 30-ї Гвардійської дивізії, 34, м. Усть-Каменогорськ, Республіка Казахстан

Жамал Ігіссінова

Східно-Казахстанський університет імені С. Аманжолова
070020, вул. 30-ї Гвардійської дивізії, 34, м. Усть-Каменогорськ, Республіка Казахстан

Анотація

Актуальність. Сучасна вища освіта акцентує увагу не тільки на професійній підготовці, але й на інтеграції студентів у світове професійне співтовариство через володіння іноземною мовою, що сприяє підвищенню кваліфікації та професійної компетентності.

Мета. Метою цього дослідження є оцінка ефективності методики змістово-мовного інтегрованого навчання (CLIL) в біологічних освітніх програмах у вищих навчальних закладах Казахстану.

Методологія. У шести навчальних закладах Казахстану було проведено напівформалізоване анкетне опитування, що включало "закриті" питання, в тому числі питання з відкритим списком, питання з одним вибором за шкалою Лайкерта і питання з декількома варіантами відповідей, всього 16 питань.

Результати. Опитування, проведене в шести навчальних закладах Казахстану, показало, що 85,5% студентів вважають, що контентно-мовне інтегроване навчання (CLIL) позитивно сприяє вивченню англійської мови в рамках біологічних освітніх програм. Це підкреслює ефективність CLIL у покращенні мовних навичок поряд із дисциплінарними знаннями. Незважаючи на різний рівень володіння англійською мовою серед учасників, дослідження показало сильну залученість студентів до CLIL, демонструючи значну зацікавленість та активну участь у навчальному процесі.

Висновки. Дослідження підтверджує ефективність CLIL у підвищенні рівня володіння англійською мовою в біологічній освіті Казахстану. Оскільки 85,5% студентів відзначили його позитивний вплив, CLIL є перспективним як ключовий метод інтеграції мовних і дисциплінарних знань. Незважаючи на різний рівень володіння англійською мовою, висока залученість студентів підкреслює ефективність CLIL. Майбутні кроки мають бути зосереджені на формалізації CLIL по всьому Казахстану, наданні підтримки викладачам і вдосконаленні методології через постійні дослідження. Впровадження CLIL готує студентів до глобального контексту, покращуючи результати навчання та міжнародну конкурентоспроможність.

Ключові слова: англійська мова; педагогіка; методика викладання; лінгвістика.