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# Application of CLIL Technology for the Bachelor's Program “Pedagogics with Two Majors: Foreign Language (English) and Computer Science”

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## Abstract

The article describes the application of CLIL technology in the implementation of the bachelor's program “Pedagogics with two majors: Foreign Language (English) and Computer Science” at the Mirny Polytechnic Institute (branch) of the M.K. Ammosov North-Eastern Federal University (MPI). The work discusses the methodological principles and peculiarities of the CLIL technology, the advantages of its implementation into the higher education system, also the major challenges that the university may encounter during its realization. The authors employ a combination of scientific and empirical methods, the central of them being the experimental one. The experiment was carried out in MPI and consisted of four stages: Prefeasibility study, Feasibility study, Implementation, Results analysis. The first stage included assessment of the human resources and technical facilities potential of the institute. The second stage concentrated on the study of the project's viability and included the analysis of the financial risks and search for funding. The third stage was connected with the implementation of the program and presented steps undertaken for the opening of the program in the institute. As a result, the viability of the program was proved and the license was obtained, necessary equipment and literature was purchased. Teaching staff attended scientific conferences and seminars on CLIL and took training courses to upgrade their knowledge of English and IT. At the moment the institute has launched the trial program for part-time students with charge and now it is ready to enrol first students to the proposed program under the state financial support.

*Keywords:* digitalization, pedagogics, CLIL technology, foreign language, computer science.

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## **Introduction**

In modern conditions of digitalization and globalization of modern education, the program with dual major, combining the professional skills of a Computer Science and Foreign Language teacher, is of particular importance.

The analysis of labor market demonstrates that there is a great lack of teachers of English and Computer Science especially in rural places of the Republic of Sakha (Yakutia), Russian Federation. Alumni of English major often combine the positions of English language and Computer Science teachers. This allowed us to think of a single program with dual majors. It is interesting to note that those who know English demonstrated good skills in IT sphere, such as programming and system administration. Some of the alumni with English major are engaged in banking. Their interview also showed that in order to be a good specialist in IT sphere one should have a command of English. That's why it seems necessary to implement CLIL technology in the realization of the proposed bachelor's program "Pedagogics with two majors: Foreign language (English) and Computer science".

Many scholars (Sidorenko & Rybushkina, 2017; Xabier, 2018; Danilov & Salekhova, 2018; Ovinova & Kolmakova, 2018; Gomez-Parra, 2020; Codo, 2020) think that CLIL is on its way to becoming one of the necessary acquirments at the universities in the world. CLIL is considered to be a driver for internationalization and globalization of education (Sidorenko & Rybushkin, 2017).

Thus, the implementation of the bachelor's program "Pedagogics with two majors: Foreign language (English) and Computer science" would become one of the ways to achieve these goals.

## **Purpose and objectives of the study**

The goal of the article is to describe the application of CLIL technology in the implementation of the bachelor's program "Pedagogics with two majors: Foreign Language (English) and Computer Science" at the Mirny Polytechnic Institute (branch) of the M.K. Ammosov North-Eastern Federal University (MPI).

## **Literature review**

The proposed program is one of the means of CLIL technology implementation.

CLIL – Content and Language Integrated Learning is interpreted as a learning technology based on the mastery of a subject area through a foreign language and a foreign language through the subject. This term was introduced by March et al. (2010), who described situations in which all academic disciplines or part

of the subjects were taught in a foreign language in order to master the subject and learn the foreign language simultaneously.

The fundamental principles of CLIL technology designated by March et al. (2010) as the four "C", we can interpret as follows:

- Content – a content component that provides the study of major subjects via foreign language (English);
- Communication – a language component that creates the conditions for the development of communication skills that allow dialogue in the professional field on the international level;
- Cognition – a cognitive component that contributes to the perception of educational material in accordance with the cognitive abilities of students;
- Culture – a cultural component, which implies the development of cross-cultural communication in the professional field in order to exchange experience and improve skills.

In European pedagogics CLIL is considered as a reconceptualization, a philosophy of language learning as well as an innovative remodelling of pedagogical perspectives (Xabier, 2018). According to the author, the full significance of CLIL implementation goes beyond methodology, as it develops out of the synergy brought about by integrating language learning methods and methodologies related to the learning of other subject matter.

In Russian higher education institutions scholars formulated the scientific basis of CLIL and verified experimentally the implementation of CLIL technology for developing computer literacy of Russian bilingual students. Their results showed that the implementation of CLIL, as a technology for teaching Computer Science, influenced the evolvement of computer literacy of bilingual students in a positive way (Danilov & Salekhova, 2018). As our experiment is also connected with Computer Science these results prove the feasibility of our project too.

Other Russian scholars regard CLIL as a simultaneous development of professional and language competences and give a special attention to the analysis of various CLIL patterns (extension of language material, modular teaching and subject immersion) while mastering the course “Professional oriented foreign language” (Ovinova & Kolmakova, 2018). Spanish authors provide a detailed comparison of CLIL and ESP. They propose collaboration with content lecturers to develop graduates’ proficiency in English that can take place both through the integration of language in content courses and through the integration of content in ESP courses to make them more relevant to disciplines’ communicative needs (Arno-Macia &

Mancho-Bares, 2015). In our previous work we also discussed peculiarities of vocational-oriented English for students of diamond mining (Goldman et al., 2018).

The distinctive feature of the program suggested is integration and balance between the two majors of different spheres of knowledge: Foreign Language and Computer Science.

The program is highly adaptable to the needs of a dynamically developing and changing labor market and the needs of Russian organizations for highly qualified, broad-profile specialists who speak a foreign language (English) and have the skills to develop, implement, operate and develop information and communication systems.

### **Methodology**

The following research methods were used: analysis of the scientific literature of home and foreign scholars in the field of pedagogy and methods of teaching foreign languages in higher education institutions; synthesis of theoretical and empirical material; as well as a method of generalizing pedagogical experience in the field of teaching. Also, empirical methods: modeling; testing and interviewing; monitoring the work of students in the process of mastering bachelor's program; experimental work; graphical presentation of the results of experimental work.

The experimental base is the Mirny Polytechnic Institute (branch) of the M.K. Ammosov North-Eastern Federal University.

The experiment consisted of the following stages (the key elements are given in brackets):

- Prefeasibility study (assessment of the potential, English language level test, challenges);
- Feasibility study (financial risks, fund search, training courses);
- Implementation stage (curriculum layout, state-funded places, purchase of software and equipment);
- Results analysis (assessment of results, plans for future).

## **Results**

The first stage, prefeasibility study, included the assessment of the human resources and technical facilities potential of the institute. In this part English language level test of the faculty was held. As the result showed, only 40% of the staff possessed the Upper-intermediate level, required for teaching the subjects in English. This difficulty was solved by means of language courses organized by Linguistic center of the English department of our institute and upgrade training courses for teachers abroad including training within CLIL.

As far as the technical infrastructure is concerned, the institute has all the necessary conditions for the training of specialists. Our facilities include academic and research laboratories with modern facilities; multi-purpose auditoriums with videoconferencing facilities; open learning center with facilities providing the virtual learning environment; four language laboratories equipped with a set of audio and computer equipment student and two comfortable dormitories with computer class, reading rooms with Internet access. The institute's library collection is wide enough to provide students with all the necessary academic and scientific literature. It is constantly being updated to let the professors and students be aware of the latest achievements in the fields of their interest. The electronic library helps to access more items both from the library and student's dormitory. All these conveniences optimize the learning environment at the institute.

Nevertheless, the following challenges occurred during the implementation of this program:

- 1) The educational program had no previous experience at the Mirny Polytechnic Institute. The pioneer set of full-time program is planned for 2020.
- 2) There were additional costs for the purchase of up-to-date equipment and software for the implementation of the program.
- 3) The disciplines of the profile were to be read in English, which was a challenge for the faculty. This difficulty was solved with the help of language courses for the teaching staff organized by the Linguistic Center of our department and language internships abroad.

The study feasibility

Next stage was dedicated to the thorough study of the project's viability. It included the analysis of the financial risks and search for funding. First of all, we created a proposal project to Russian Foundation for Basic Research on the topic of the CLIL technology implementation.

Except financial part we also paid much attention to the training courses of the project implementers. We took part in conferences and webinars on the CLIL technology and studied it by means of methodological literature observation. For example, we participated in XXVI International Scientific Conference of Students, Postgraduates and Young Scientists “Lomonosov” April 8-12, 2019, Moscow, Russian Federation; 4th All-Russian scientific conference “Improvement of education quality in modern conditions”, February 15, 2019, Yakutsk, the Republic of Sakha (Yakutia), Russian Federation; Seminar-meeting “Languages of the indigenous minorities of the North, Siberia and the Far East in educational system: present state and perspectives of development”, September 19-21, 2019, Naryan-Mar, Nenets Autonomous Okrug, Russian Federation; 2nd International Conference on Pedagogy, Communication and Sociology (ICPCS 2020), January 6–7, 2020, Bangkok, Thailand.

#### Implementation stage

At this stage we have worked out a curriculum. The license for realization of the bachelor’s program “Pedagogics with two majors: Foreign language (English) and Computer science” was obtained from Federal Service for Supervision in Education and Science (Rosobrnadzor). In 2018 a trial program was launched for part-time students with charge for education. The monitoring of the work of these students in the process of mastering bachelor’s program showed that they were good at both English and Computer science and were ready for acquisition of the major disciplines in English that convinced us of possibility of application of CLIL in the realization of the program for the full-time students.

At the moment the institute is ready to start education of the full-time students on the bachelor’s program “Pedagogics with two majors: Foreign language (English) and Computer science”. Fifteen state-funded vacant places are open for 2020 enrolment, which is a good foundation for launching the program for full-time students. The library has purchased all the necessary educational literature to provide the implementation of the program. Computer Science department founded an academic and scientific laboratory for IT. The English department possesses two language laboratories and a multi-purpose auditorium with videoconferencing facilities and virtual learning environment. Agreements on internship were signed with eight leading schools of the Sakha republic (Yakutia), Russian Federation. The teaching staff is represented by experienced professors with Doctor of science and Candidate of science - research doctorate degrees. They attended training courses of English language and also upgrade courses on the use of IT in education sphere: “The use of information and communication technologies in the educational process: Advanced training program “Specialist English and European methods of teaching foreign languages on technical programmes, Dublin, Republic of Ireland, November, 28-December, 10, 2015; Development and use of online courses”, Far Eastern Federal University, Vladivostok, Russian Federation,

October, 1-November, 20, 2018; online-course “Teaching English to Young Learners”, George Mason University, USA, 2019; “Modern e-learning technologies”, Yakutsk, the Republic of Sakha, Russian Federation, April, 15-May, 28.2019; English language courses of Linguistic Centre of the English department, Upper-intermediate level, MPI, NEFU, Mirny, the Republic of Sakha, Russian Federation, 2016-2020.

The following major subjects are due to be delivered in English: English lexicology, Theoretical phonetics of the English language, Theoretical English Grammar, Introduction to linguistics, History of English, English Stylistics, Fundamentals of Mathematical Information Processing, Networking and Internet, Theoretical Foundations of Computer Science, Higher mathematics, Computer architecture, Computer modelling, Databases and information systems, Computer software with practical problem solving and Informatization of educational process management.

#### Results analysis

At the given moment the implementation stage is in progress. Autumn 2020 the first full-time students will be enrolled. We are really excited to be the pioneers of the project. If the implementation is successful, we will continue its development by adding an international exchange program of the same dual major. We hope that all the necessary conditions were created and the project will prove its efficiency and the alumni will be demanded in the labor market.

#### **Discussions**

As a result of the investigation carried out one can figure out the following positive aspects of the CLIL technology:

- ✓ formation of a multidimensional, expanded spectrum of knowledge, skills necessary for the future profession as a whole, and for foreign professional communication, in particular (Content);
- ✓ development of the ability to analyze and evaluate the information received, using critical thinking (Cognition);
- ✓ increasing the motivation and interest of students through the use of foreign language competencies in communication (Communication);
- ✓ development of the ability to adapt to a new situation, readiness for cooperation (Culture).

Despite the positive potential of CLIL, there are a number of difficulties:

- administrative difficulties and financial intricacies;
- absence of explicitly-set and graded linguistic goals;
- lack of teaching staff with good level of English;
- little cooperation of educational institutions on the international level.

Spanish investigators highlight that CLIL comes from two main sources: native assistants and exchange programs. They contrasted data with the views of school principals and bilingual coordinators, who declared that these two sources were scarce because of administrative and financial difficulties. Scholars revealed how improving these areas can lead not only to improved scores but also to a better implementation of the CLIL (Gomez-Parra, 2020).

Other Spanish authors point out that CLIL can't achieve its full potential if it is attributed to the absence of explicitly-set and graded linguistic goals (Codo, 2020). That's why it is vitally important to understand the goal of CLIL which is closely connected with today's reality of globalization and internationalization of the higher education.

The third problem is connected with the lack of teaching staff with proper level of English to deliver classes in it. In our project we solve it by means of English courses for teachers as well as internships abroad.

The last point is not less problematic especially for distant regions like the republic of Sakha, nevertheless, NEFU (the head university) has great experience of international exchange programs which makes us believe that this difficulty can also be solved.

## **Conclusion**

The analysis of implementation of CLIL technology in the bachelor's program "Pedagogics with two majors: Foreign Language (English) and Computer Science" at the Mirny Polytechnic Institute (branch) of the M.K. Ammosov North-Eastern Federal University allowed us to conclude that the following components of CLIL can be included:

- major subjects are delivered in English (Content);

- development of communication skills that allow dialogue in the professional field on the international level (Communication);
- cognitive component that contributes to the perception of educational material in accordance with the cognitive abilities of students (Cognition);
- development of cross-cultural communication in the professional field in order to exchange experience and improve skills (Culture).

Thus, the use of CLIL technology in the implementation of the bachelor's program "Pedagogics with two majors: Foreign language (English) and Computer science" can become an effective tool for training highly qualified teaching staff in demand in the modern conditions of the educational system. The experimental work carried can serve as a recommendation for CLIL implementation for other higher educational institutions.

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