

Abstract

on the dissertation submitted by Nazerke Amanzhol

Topic: «Developing professionally oriented foreign language communicative competence of science pre-service teachers based on CLIL»

Submitted for the degree of Doctor of Philosophy (PhD) Educational

Program: 8D01103 - Pedagogy and Psychology

Research Background and Significance. In the era of contemporary globalization and rapid information technology development, the integration of Kazakhstan's educational system into the global educational space is a strategic priority of state policy. The Concept for the Development of Higher Education and Science of the Republic of Kazakhstan for 2023–2029 places particular emphasis on preparing competitive pedagogical personnel characterized by high professional competence and multilingual proficiency. These requirements are especially pertinent for Science and Mathematics teachers, who are considered the driving force of scientific and technological progress.

The relevance of this research is determined by the specific demands of the nation's trilingual education policy and the systemic contradictions arising during its implementation. Despite the transition to teaching Physics, Chemistry, Biology, and Computer Science in English within secondary schools, practice reveals a critical shortage of specialists capable of qualitatively executing this reform. The traditional higher education system is primarily oriented toward either deepening subject-specific knowledge or developing isolated language skills; however, a methodological system that professionally integrates these two domains remains underdeveloped. Mastering English not only as a means of communication but as a professional tool and a medium for scientific inquiry is an essential contemporary requirement for pre-service teachers.

In this context, Content and Language Integrated Learning (CLIL) technology is viewed as an innovative solution in teacher education. The "4Cs" framework of CLIL (Content, Communication, Cognition, and Culture) enables future educators to acquire a foreign language within a professional context, enhances academic mobility, and provides access to international information resources.

However, within domestic pedagogical science, the scientific and methodological foundations for adapting CLIL technology to the preparation of Science teachers—specifically the structural-content model for developing professionally oriented communicative competence—remain insufficiently explored.

An additional factor of research relevance is the demand of the modern labor market. Contemporary employers require not only specialists with profound subject knowledge but also professionals capable of critical thinking in a foreign language and free communication in a professional environment.

The following scholars have extensively researched various aspects of professional competence: G.Zh. Niyazova, M.Kh. Baltabayev, Sh.T. Taubayeva, G.Zh. Menlibekova, K.S. Kudaibergenova, B.T. Kenzhebekov, G.M. Kassymova, S.S. Kunanbayeva, L.K. Karabayeva, and others.

The challenges associated with developing the communicative competence of future specialists have been addressed in the works of F.Sh. Orazbayeva, S.R. Rakhmetova, K.T. Muldabekova, P.S. Kudabayeva, T.M. Yesimgaliyeva, K.O. Orazbayeva, D.K. Sadirbekova, G.A. Rizakhodzhayeva, A.B. Tasova, S.T. Tleubai, among others.

Regarding the issue of foreign language communicative competence in educators, foundational research includes the works of such prominent scholars as I.L. Bim, I.A. Zimnyaya, A.V. Khutorskoy, N.V. Kuzmina, N.L. Goncharova, E.I. Baguzina, E.L. Solovova, M. Canale, M. Swain, D.H. Hymes, L. Bachman, and A.S. Palmer. Among domestic research, particular emphasis should be placed on the cognitive-linguocultural methodology of S.S. Kunanbayeva and the multilingual education strategies developed by B.A. Zhetpisbayeva.

The theoretical and methodological foundations of CLIL (Content and Language Integrated Learning) technology are comprehensively detailed in the seminal works of D. Coyle (the "4C" framework), D. Marsh, P. Mehisto, and J. Cummins.

The issues surrounding the implementation of CLIL and trilingualism within the Kazakhstani context have been highlighted in the works of L.Ch. Karabassova, A.E. Kubeyeva, A.S. Dontsov, I. Babich, M.T. Satayeva, S. Nariman, and other scholars. Their doctoral research explores the specifics of applying CLIL technology to the teaching of individual disciplines, such as Chemistry, Biology, and Computer Science.

Nevertheless, the structural-content model for the systematic development of professionally oriented foreign language communicative competence in future Science and Mathematics teachers at the university level, as well as the methodological system for its implementation through CLIL technology, remain insufficiently studied. This gap in the existing body of research defines the scientific novelty of this work.

Drawing upon the works of the aforementioned domestic and foreign scholars, it can be asserted that the problem of developing the communicative competence of future Science and Mathematics teachers has been researched to a significant extent in pedagogical science and practice. However, an analysis of the theoretical literature regarding the formation of professionally oriented foreign language communicative competence, as well as an examination of current pre-service teacher training practices, has revealed a number of **contradictions** between:

the high demand from society and the state for Science and Mathematics teachers who meet international standards and are capable of conducting

professional activities in English, and the inability of the traditional university training system to fully satisfy this demand;

the need of future educators for foreign language professional communication and the insufficiency of scientific, methodological, and educational-organizational support for its realization;

the high pedagogical potential of CLIL technology and the absence of a scientifically grounded model for its adapted application within the domestic higher education system.

The necessity of finding ways to resolve these contradictions determined the choice of the research topic: «Developing professionally oriented foreign language communicative competence of science pre-service teachers based on CLIL».

Research Aim: To determine the theoretical foundations and pedagogical conditions for developing professionally oriented foreign language communicative competence of science pre-service teachers based on CLIL, to design its structural-content model, and to experimentally substantiate their effectiveness.

Object of the Research: The process of professional training for science pre-service teachers within a higher education institution.

Subject of the Research: The process of developing professionally oriented foreign language communicative competence of science pre-service teachers based on CLIL.

Research Hypothesis: If a complex of specific pedagogical conditions based on CLIL technology is identified within the training process of science pre-service teachers, and a structural-content model designed on their basis is implemented into the educational process, then the level and quality of students' professionally oriented foreign language communicative competence will significantly increase. This is because these pedagogical conditions and the model transform the foreign language from an isolated academic discipline into a natural cognitive tool for mastering complex science and mathematics content, optimize the learners' cognitive load, and ensure the sustainable growth of their professional self-efficacy within the context of subject-language integration.

Research Objectives:

1. To theoretically substantiate the process of developing professionally oriented foreign language communicative competence of science pre-service teachers based on CLIL and to clarify the essence of the concept "professionally oriented foreign language communicative competence."

2. To identify the pedagogical conditions for developing professionally oriented foreign language communicative competence of science pre-service teachers based on CLIL.

3. Based on the identified pedagogical conditions, to design a structural-content model for developing the professionally oriented foreign language communicative competence of science pre-service teachers.

4. To verify the effectiveness of the proposed model and methodology through a pedagogical experiment during the experimental research phase, and to develop scientific and methodological recommendations.

Leading Research Idea: The research is based on a conceptual transition from the traditional paradigm of perceiving a foreign language as an isolated academic discipline toward its recognition as a holistic cognitive tool for the professional thinking of science pre-service teachers. The integration of subject and language content through CLIL technology and a complex of specific pedagogical conditions eliminates the artificial gap between linguistic and specialized training. This approach transforms foreign language competence from a mere "additional skill" into a fundamental cornerstone of the professional self-efficacy of a new generation of educators, capable of fluently teaching complex scientific disciplines within a global multilingual environment.

Theoretical and Methodological Foundations of the Research: The theoretical and methodological framework of the research is composed of the following scientific approaches and concepts:

- Philosophies of Pragmatism and Constructivism: The formation of knowledge through experience;
- Learner-Centered and Activity-Based Approaches: Based on the works of L.S. Vygotsky and A.N. Leontiev;
- Competency-Based Approach: Represented in the research of I.A. Zimnyaya, A.V. Khutorskoy, and S.S. Kunanbayeva;
- Theory of Content and Language Integrated Learning (CLIL): Formulated by D. Coyle, D. Marsh, and P. Mehisto;
- Theory of Intercultural Communication: Grounded in the works of E.T. Hall and M. Byram;
- Theories of Bilingualism and Multilingualism: Developed by J. Cummins and B.A. Zhetpisbayeva.

Research Sources: The laws of the Republic of Kazakhstan "On Education" and "On the Status of the Teacher"; the Concept for the Development of Higher Education and Science in the Republic of Kazakhstan for 2023–2029; the "Teacher" professional standard; the State Compulsory Standard of Education (GOSO); and the works of foreign and domestic scholars indexed in the Scopus and Web of Science bibliometric databases.

Research Methods: To achieve the research aim, a mixed-methods approach was employed:

- Theoretical methods: Analysis of psychological, pedagogical, and linguistic literature; modeling; generalization; and comparison.
- Empirical methods: Quasi-experiment; surveying (utilizing the Self-Efficacy Scale); semi-structured interviews; and pedagogical observation.
- Data analysis methods: Quantitative processing of results using Student's t-test (via Jamovi software) and qualitative processing through thematic analysis.

Research Site (Setting): The experimental research was conducted at the Higher School of Natural Sciences of the Margulan University (Pavlodar Pedagogical University), involving students from the educational programs "6B01540 – Chemistry" and "6B01530 – Mathematics."

Main Research Stages: In accordance with the set aim, the research was conducted in three stages:

First Stage (Theoretical-Exploratory): A comprehensive literature review on the research problem was performed; the conceptual framework was refined; and the research methodology and hypothesis were defined.

Second Stage (Experimental-Pedagogical): The structural-content model and a specialized course were developed and implemented into the educational process. Diagnostic assessments and a formative experiment were conducted within both control and experimental groups.

Third Stage (Generalizing-Analytical): Statistical processing of the obtained results was carried out; a qualitative analysis was performed; conclusions were formulated; and scientific and methodological recommendations were developed.

Scientific Novelty of the Research:

1. The process of developing professionally oriented foreign language communicative competence of science pre-service teachers based on CLIL has been theoretically substantiated, and an original author's interpretation of the concept "professionally oriented foreign language communicative competence" has been provided.

2. The pedagogical conditions for developing professionally oriented foreign language communicative competence of science pre-service teachers based on CLIL have been identified.

3. A structural-content model for developing professionally oriented foreign language communicative competence of science pre-service teachers based on CLIL has been developed; its integrative potential in overcoming cognitive dissonance during the simultaneous mastery of subject matter and language has been scientifically grounded.

4. The effectiveness of the linguodidactic support system, which increases the professional self-efficacy of future specialists at a statistically significant level, has been proven through experimental research, and scientific-methodological mechanisms for its implementation in higher education institutions have been proposed.

Practical Significance of the Research: The research findings and the developed course, "Professional Communication for Science Teachers: A CLIL Approach," can be integrated into teacher training programs at higher education institutions, within professional development systems for educators, and in schools implementing multilingual education. The proposed methodological system facilitates an increase in students' proficiency levels in professional English and enhances their competitiveness in the contemporary labor market.

Main Provisions for Defense:

1. Professionally oriented foreign language communicative competence is an integrative quality characterizing the ability and readiness of a future teacher to act effectively in a global professional environment, master subject knowledge, and transmit it to learners using a foreign language as a means of communication and cognition within professional activities.

2. Pedagogical conditions for developing professionally oriented foreign language communicative competence of science pre-service teachers based on CLIL (organizational-content, psychological-facilitative, didactic-technological, and praxeological-reflective conditions) serve as the primary didactic mechanism that transforms a foreign language from an isolated academic discipline into a tool for professional cognition and purposefully optimizes the cognitive load of students.

3. The structural-content model, based on the identified pedagogical conditions, functions as a holistic educational ecosystem representing a synergy of target, content, organizational-activity, and evaluative-resultative components. This model levels cognitive dissonance during the simultaneous mastery of subject matter and language and ensures the purposeful professional transformation of the future teacher.

4. Specially developed integrative content, acting as the scientific and methodological support for the research process, is the key mechanism for transitioning a student's cognitive activity from a basic informational-cognitive level to a level of professional-pedagogical transformation. Its experimental effectiveness is proven by a statistically significant increase in the professional self-efficacy of future specialists.

Approbation and Implementation of Research Results: The findings of this research have been disseminated through 4 articles published in high-ranking peer-reviewed journals indexed in the Scopus database (Q1–Q2). The results of the experimental research have been successfully implemented into the educational process at the research site, as confirmed by the relevant certificate of implementation.

List of Key Publications:

1. Sarmurzin, Y., Amanzhol, N., Toleubayeva, K., Zhunusova, M., & Amanova, A. (2021). The impact of OECD research on the education system of Kazakhstan. *Asia Pacific Education Review*, 22, 757-766. <https://doi.org/10.1007/s12564-021-09715-8>

2. Sarmurzin, Y., Amanzhol, N., Toleubayeva, K., Zhunusova, M., Amanova, A., & Abiy, A. (2024). Challenging aspects of Kazakhstan's trilingual education policy: evidence from a literature review. *Asia Pacific Education Review*, 25(4), 801-81. <https://doi.org/10.1007/s12564-023-09823-7>

3. Amanzhol, N., Amanova, A., Kerimbekova, B., Zholamanova, A. & Sarmurzin, Y. (2024). "My expectation did not meet reality": challenges of undergraduate students in English-medium instruction in Kazakhstan. *Asian*

Education and Development Studies, 13(1), 31-44.
<https://doi.org/10.1108/AEDS-06-2023-0062>

4. Sarmurzin, Y., Kerimbekova, B., Toleubaeva, K., Zhunusova, M., Amanzhol, N., & Zhumagulov, A. 2024. "Forced us to adopt alternative pedagogical approaches": Kazakhstani reading literacy improvement initiatives. *Research in Comparative and International Education*.
<https://doi.org/10.1177/17454999251342142>

Reliability and Validity of the Research Results: The reliability and validity of the research findings are ensured by their foundation on fundamental scientific theories; the alignment of the applied methods with the stated research objectives; the long-term and comprehensive nature of the experimental work; the confirmation of quantitative data through mathematical and statistical analysis (validity and reliability coefficients); as well as the publication of results in scientific journals and their implementation into educational practice.

Dissertation Structure. The dissertation consists of an introduction, three main sections, a conclusion, a list of references, and appendices.

The Introduction substantiates the choice of the research topic and its relevance; defines the object, subject, aim, hypothesis, and research objectives; presents the leading idea, theoretical and methodological foundations, the research setting, the main stages of the study, the scientific novelty, and the theoretical significance of the work, as well as the practical value of the research. Furthermore, the main provisions for defense are clarified, and information regarding the approbation and implementation of the experimental research results is provided.

The First Section, titled "Theoretical Foundations for Developing Professionally Oriented Foreign Language Communicative Competence of Science Pre-service Teachers Based on CLIL," presents the theoretical prerequisites for the formation of this competence in future science and mathematics educators. The essence, structure, and content of this concept are clarified within the context of CLIL technology.

The Second Section, titled "Scientific and Pedagogical Foundations for Developing Professionally Oriented Foreign Language Communicative Competence of Science Pre-service Teachers Based on CLIL," defines the pedagogical conditions for the formation of this competence and proposes a structural-content model of its formation process based on CLIL technology.

The Third Section, titled "Experimental Research on Developing Professionally Oriented Foreign Language Communicative Competence of Science Pre-service Teachers Based on CLIL," details the development of the content and methodological support for the specialized course "Professional Communication for Science Teachers: A CLIL Approach." It also presents the results and analysis of the conducted experimental research.

The Conclusion summarizes the main research results, formulates conclusions, and provides recommendations developed based on the dissertation work.

The Appendix contains research materials that disclose the detailed content of the experimental research.