

ANNOTATION
of the dissertation on “Formation of the readiness of pre-service teachers to teach chemistry in English” for the degree of Doctor of Philosophy (PhD)
specialty “8D01540 - Chemistry”
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Research topic: Formation of the readiness of pre-service teachers to teach chemistry in English.

The purpose of the study: to theoretically substantiate, design, test a model of a methodological system for the formation of the readiness of future teachers to teach chemistry in English in the process of professional training at a university and the pedagogical conditions for its effective implementation.

Research objectives:

- to carry out an analysis of the scientific development of the problem of forming the readiness of pre-service teachers to teach school subjects in a foreign language, and the current state of readiness of pre-service teachers of educational institutions of the Republic of Kazakhstan to teach natural science subjects in English;
- to carry out a theoretical and methodological substantiation of the application of the CLIL methodological concept in the process of preparing pre-service chemistry teachers to work in a multilingual school;
- to determine the complex of special competencies of future CLIL-teachers on the basis of competency-based and integrated subject-language approaches;
- to clarify the concept of "the readiness of pre-service teachers to teach chemistry in English", determine its structure and the essential and content characteristics of the components within the framework of the CLIL methodological concept;
- develop, scientifically substantiate and test a model of a methodological system for the formation of the readiness of pre-service teachers to teach chemistry in English at school and prove the effectiveness of the set of proposed pedagogical conditions for its successful implementation.

Research methods:

- theoretical methods (study, analysis of educational and methodological, psychological and pedagogical literature, monographs, dissertations on the research problem; legal sources; classification and systematization, comparison, synthesis, inductive and deductive generalization of information, pedagogical modeling);
- empirical methods (direct and indirect observation, expert assessments, testing, interviewing, online questioning, analysis of audio recordings, self-assessment, pedagogical experiment);
- methods of mathematical statistics (Shapiro-Wilk, Kruskal-Wallis, Mann-Whitney, Wilcoxon tests).

Main statements for the dissertation defense:

1. the readiness of pre-service teachers to teach chemistry in English is an integral part of the professional readiness for teaching and a complex of special competencies of the future CLIL teacher, systemic education, which is a set of motivational (sustainable professional and cognitive motives, a positive attitude towards teaching chemistry in English, interest in it), content-cognitive (knowledge of the subject and methods of teaching it using the target language at various cognitive levels), praxeological (planning and teaching chemistry in English using the "4C" principles), reflective-evaluative (adequate self-assessment of the practice of teaching chemistry in English) components. Its structure and the essential content characteristics of the components are closely intertwined with certain competencies of the future CLIL teacher, which consist of cognitive academic language competence (CALP), the competence of planning and teaching an integrated subject-language lesson, the competence of student assessment and assessment of the quality of an integrated subject-language teaching;

2. The model of the methodological system for the formation of the readiness of pre-service teachers for teaching chemistry in English includes: the target component which is a set of goals formulated for each of the four components of readiness; a content component presented by the developed educational and methodological complex for the elective course "Learning and teaching Chemistry through English"; procedural component which includes methods, strategies, forms, tools aimed at improving the skills of teaching chemistry in English, as well as the approach developed by us to integrate CLIL and IBL; an evaluative and effective component, represented by expected results, criteria, levels of readiness and independently developed tools for assessing the readiness of a pre-service teacher to teach chemistry in English;

3. a set of special pedagogical conditions for the successful implementation of the designed methodological system to form the readiness of future teachers to teach chemistry in English in schools of the Republic of Kazakhstan, including: integration of chemical, language, methodological knowledge of pre-service chemistry teachers based on 4C principles; providing self-organized, process-based knowledge search, question-driven interactive training of pre-service chemistry teachers in the subject and pedagogical fields in English using scaffolding; involvement of students in systematic reflective practice for the formation of the adequate self-esteem.

The main results of the study:

1. clarified the content of the concept of "the readiness of pre-service teachers to teach chemistry in English", defined its structure and essential content characteristics of the components;

2. scientifically substantiated and developed a model of a methodological system for the formation of the readiness of pre-service teachers to teach chemistry in English in schools of the Republic of Kazakhstan;

3. determined and theoretically substantiated a complex of special pedagogical conditions for the successful implementation of the designed model of the methodological system for the formation of the readiness of pre-service teachers for teaching chemistry in English.

Justification of the novelty and importance of the results obtained:

The first result is new because the content of the concept of "pre-service teachers' readiness to teach chemistry in English" has been clarified within the framework of the CLIL methodological concept, the structure and essential content characteristics of the components of pre-service teachers' readiness to teach chemistry in English, which are closely intertwined, have been determined. with certain competencies of a future CLIL teacher.

The second result is new because for the it is the first time when a model of a methodological system for the formation of the readiness of pre-service teachers to teach chemistry in English in schools of the Republic of Kazakhstan has been scientifically substantiated and developed.

The third result is new, since a set of special pedagogical conditions for the successful implementation of the designed model of the methodological system for the formation of the readiness of pre-service teachers to teach chemistry in English has been defined and theoretically substantiated.

Compliance with the directions of development of science or state programs:

The dissertation research corresponds to the priority direction of the development of science for 2021 - 2023 - "Research in the field of education and science" and is based on the Message of the First President of the Republic of Kazakhstan Nazarbayev N.A. "Kazakhstan way – 2050: common goal, common interests, common future" of January 17, 2014; State obligatory standard for basic secondary and general secondary education of the Republic of Kazakhstan dated August 3, 2022: annex to the order of the Minister of Education of the Republic of Kazakhstan dated August 3, 2022 No. 348; State obligatory standard of higher and postgraduate education of the Republic of Kazakhstan dated July 20, 2022: Appendix 1 to the order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2; Law of the Republic of Kazakhstan "On Education" dated July 27, 2007 No. 319-III (as amended and supplemented as of 08.01.2021); Professional standard "Teacher". Annex to the order of the Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 133 dated June 8, 2017; State program for the implementation of the language policy in the Republic of

Kazakhstan for 2020 - 2025: Decree of the Government of the Republic of Kazakhstan dated December 20, 2018 No. 846; the National Qualifications Framework, approved on March 16, 2016 by the Republican Tripartite Commission on Social Partnership and Regulation of Social and Labor Relations; Message of the President of the Republic of Kazakhstan K.K. Tokayev "Constructive public dialogue - the basis of stability and prosperity of Kazakhstan" dated September 2, 2019

Contribution of the doctoral student to the preparation of each publication (shown as a percentage of the total publication in brackets)

According to the content of the research work, 19 articles were published. One of these is included in the Scopus abstract and citation database:

1. Integration of IBL and CLIL in preparing prospective teachers for teaching natural sciences in multilingual environment // Education Integration. -2021. - V. 25, No. 2. - P. 304–320 (co-authors: Omarova V., Baratova A., Churkina N., 75%).

Three articles have been published in publications recommended by the Committee for Quality Assurance in Education and Science:

1. Exploring pre-service chemistry teachers' attitudes towards learning a subject in English in Kazakhstan // Bull. Pedagog. Sci. – 2020. – Vol. 66, № 2.– P. 265–271 (Co-authored by: Baratova A., Shomanova Zh. 75%);

2. The main features of professional motivation of students to study chemistry in English // Bulletin of the Eurasian National University named after L.N. Gumilyov. Series Pedagogy. Psychology. Sociology. - 2020. - Vol. 132, No. 3. -P. 43-54. (co-authors: Shomanova Zh., Mukanova R., 75%);

3. Development of methodology and study of cognitive motivation of students to study chemistry in English // Bulletin of Karaganda University. Series "Pedagogy". - 2020. - Vol. 98, No. 2. - P. 32–45. (co-authors: Shomanova Zh., Achkinadze O., Churkina N., 70%).

One article was published in a scientific journal of a neighboring country:

1. Development of tools for assessing the cognitive-meaningful readiness of pre-service teachers to teach a profile subject in a multilingual environment // Modern problems of science and education. 2021. №. 3. <https://science-education.ru/ru/article/view?id=30948> (100%).

14 articles were published in editions of materials of local and foreign conferences:

1. Model of formation of pre-service teachers' readiness for teaching Chemistry in English // Proceedings of the XXIV International Scientific and Practical Conference Social and Economic Aspects of Education in Modern Society Vol.1, December 25, 2020, Warsaw, Poland p. 29-35. (co-author: Shakirova Z., 80%);

2. Competences of pre-service teachers necessary for teaching chemistry in English // Pedagogical education in the context of transformational processes: the space of self-realization of the individual Sat. scientific Art. IX Intern. scientific-practical conference, Minsk, November 11, 2020 / Belarus. state pedagogical university named after Maxim Tank; under scientific ed. Poznyak A.V. - Minsk, 2020. P.106-109. (100%);

3. On the issue of creating a teaching aid for chemistry students of pedagogical universities based on the "4C" principles // Horizons of Education. - Omsk, 2020. - P. 190-193. (co-author: A. Baratova, 75%);

4. Assessment of the praxeological component of the readiness of pre-service teachers to teach natural science subjects in a multilingual environment // X International Scientific and Practical Conference "Innovative Aspects of the Development of Science and Technology". - Saratov, 2021. - P. 299–308 (100%);

5. Selection of CLIL and IBL models to prepare pre-service science teachers for teaching in English. // Questions of teaching methods: from the classical system to blended learning. Collection of scientific papers of the International Scientific and Practical Conference. Selected / Comp. Shakhnazaryan V.M.; ed. Petrova M. - Moscow: Center for SNI and OT, 2021. - P. 26–34 (co-author: Shakirova Z., 70%);

6. Attitude and motivation of pre-service teachers to the study of a specialized subject (chemistry) in English // Proceedings of the II International Scientific and Practical Conference. / ed.

Chekaleva N.V. - Omsk: OmGPU, 2021. - P. 417-420. (co-authors: Nazarova N., Panasenko E., Kurdumanova O., 50%);

7. Formation of conditions for the preparation of future teachers to teach chemistry in English // "XXI Satbayev studies" of young scientists, graduate students, students and schoolchildren: international conference materials - Pavlodar: Toraighyrov University, 2021. - P. 146–151. (100%);

8. Formation of the readiness of pre-service chemistry teachers to teach in English with the help of the interactive textbook "Learning and teaching chemistry in English" // "XXI Satbayev studies" of young scientists, graduate students, students and schoolchildren: international conference materials - Pavlodar: Toraighyrov University, 2021. - P. 158–163. (100%);

9. Approaches to CLIL and IBL integration in preparing pre-service chemistry teachers // «XXI Satbayev studies" of young scientists, graduate students, students and schoolchildren: international conference materials. – Pavlodar: Toraighyrov University, 2021. - P. 152–157. (co-authors: Baratova A., Mukanova R., 70%);

10. Teaching students on the basis of subject-methodological request and methodology of CLIL in the period of production practice in school // "XX Satbayev studies" of young scientists, graduate students, students and schoolchildren": Proceedings of the international scientific conference. - Pavlodar: PSU named after S Toraighyrov, 2020. P. 401–406 (100%);

11. E-GLOSSARY as an effective tool to upgrade pre-service and in-service chemistry teachers' knowledge of their subject // "XX Satbayev studies" of young scientists, graduate students, students and schoolchildren": materials of the international scientific conference. - Pavlodar: PSU named after S. Toraighyrov, 2020. - P. 413–418. (co-author: Baratova A., 80%);

12. Motivational factors for studying chemistry in English among students // Proceedings of the international scientific conference of young scientists, undergraduates, students and schoolchildren "XX Satbayev studies ". - Pavlodar: PSU, 2020. - P. 406-413. (100%);

13. Formation of conditions for the preparation of pre-service teachers to teach chemistry in English // "XXI Satbayev studies" of young scientists, graduate students, students and schoolchildren: international scientific conference materials- Pavlodar: Toraighyrov University, 2021. – P. 146–151 (100%);

14. On the results of approbation of the model of the methodological system for the formation of the readiness of pre-service teachers to teach chemistry in English and the conditions for its effective implementation // "Russian Science in the Modern World" XLVII International Scientific and Practical Conference. - M.: "Research and Publishing Center" Actuality.RF", 2022. - P. 156–158. (100%).

Three educational and methodical collections and a syllabus were published:

1. Learning and Teaching Chemistry in English: from Theory to Practice and Lesson Planning. – Pavlodar: Pavlodar State Pedagogical University, 2020. – 424 p. (co-authors: Shomanova Zh., Baratova A., 70%);

2. Guidelines for the course "Learning and Teaching Chemistry in English". - Pavlodar: NAO "Pavlodar Pedagogical University", 2021. - 200 p. (co-authors: Shomanova Zh., Baratova A., 70%);

3. Control and measuring materials for the course "Learning and teaching Chemistry in English". - Pavlodar: PPU, 2021. - 66 p. (co-authors: Vishenkova E. A., Cajucom Sallador E., Mukanova Zh. S., Prinsloo N., Shomanova Zh. K., 50%);

4. The program of the elective course "Learning and teaching Chemistry in English"// Syllabus Pavlodar State Pedagogical University 2021. - 66 p. (co-authors: (Shomanova Zh., Mukanova R., 70%).

5 copyright certificates were obtained: "Electronic glossary "GlossChemistry". Computer program. No. 8995 dated 03/26/2020 (co-authors: Bekbolat A.B. Toktaganov T., Yelzhan E. Baratova A., 50%); "Methodology for assessing the level of cognitive motivation of students of pedagogical universities to study chemistry in English." Measuring materials No. 8649 of 03/06/2020 (100%); "Methodology for preparing pre-service teachers for teaching chemistry in English" No. 14009 dated 12/22/2020 (100%); "Methodology for assessing the level of professional motivation of students of pedagogical universities to study chemistry in English." Measuring materials No. 8648 dated March

6, 2020 (100%); "Electronic textbook CIE-Ebook" Electronic textbook No. 15158 dated February 15, 2021 (co-authors: Baratova A., Tyulkov A., Kazantsev N., Toktaganov T., Yelzhan E., Bekbolat A., 50%).

In addition, practical developments within the framework of the dissertation research were recognized as the best in the Regional competition of didactic and methodological developments "Multilingual and multicultural education is the path to peaceful and sustainable development", organized as part of the Central Asian Educational Program of the OBSE HCNM (CAEP OSCE HCNM) in September-November, 2021 in the nominations "Teaching materials and elective courses, (programs and materials / teaching aids for elective / optional courses", "Teacher training program for schools and kindergartens implementing multilingual education programs"