

ABSTRACT

on the thesis for the degree of Doctor of Philosophy (PhD)

on specialty «6D011300 – Biology»

Abdukadirova Zhansaya Abdimuratovna

“Forming of innovative thinking of future biology teachers on tuition of plant anatomy and morphology”

The relevance of research. Currently, one of the urgent problems facing our state is the development of global competitiveness of the country.

The Law of the Republic of Kazakhstan «On Education» states that «The main task of education system is to create the necessary conditions for education, aimed at the formation and professional development of an individual based on national and universal values, achievements of science and practice, development of creative, spiritual and strength capabilities personality, informatization of education, enrichment of the intellect through the introduction of innovative learning technologies and access to the international global communication networks». The implementation of these tasks involves the development of the implementation and effective use of innovative learning technologies.

These days, the implementation of significant innovations in the formation of the theoretical foundations of the content and structure of educational activities, which are implemented in the practical use of subject programs and textbooks. In the process of civilization and globalization in the world of cultural development, deep and quality education, integration into the world educational space. Today, one of the topical issues is the formation of a fully developed personality by implementing a deep and high-quality education, mastering culture in the process of civilization and globalization in the world.

Leader of the nation Nazarbayev N. A. in the message «New Kazakhstan in the new world» indicates that «The sixth task is to promote education and professional development, to strengthen the foundations of a vibrant economy, to use new technologies, ideals and viewpoints, to develop innovative economy. The main criterion for the success of the education reform is increasing the level of any citizen of the country who acquired knowledge and skills to the level of specialist who is demanded in any country of the world».

In recent years, the world experience has shown that in developed countries, along with theoretical knowledge, the education system is focused on research and design, student and practice-oriented technologies, on the basis of which the innovative thinking of future specialists increases. Based on international experience, the Law of the Republic of Kazakhstan «On science», higher education institution should focus not only on the education of future specialists, but also on research work.

A special place in the training of specialists-biologists takes a scientific experience, therefore the main condition for the formation of a comprehensive thinking of students is the conduct of scientific research. One of the main components of biology is the anatomy and morphology of plants. The peculiarity of this discipline is that students through laboratory work form an idea of the

structural features of plants, develop a scientific worldview and comprehensive thinking. In this regard, the main purpose of our research work is the formation of innovative thinking of future biologists in the study of the discipline “Anatomy and morphology of plants” through scientific research.

In the field of education of the country, researchers and teachers presented scientific works aimed at training future specialists in the field of education based on the formation and organization of innovations, through the development of innovative thinking. Therefore, nowadays, one of the most important problems of training future specialists is the formation of innovative thinking of students-biologists. If the applicant combines theoretical training with practice, research work, then his or her innovative thinking and personal creative abilities will be improved.

The authors made research analyses in the education system, looking at their object of study, made a huge contribution to pedagogy; however, the results of the analysis of scientific works show a small number of works on the problem of formation of future specialists' innovative thinking. Therefore, public and social demand, as well as scientific and methodological research are an important prerequisite for identifying the problem on formation of innovative thinking in future professionals.

Innovative thinking positively influences the versatile development of a specialist as a quality mark of personality; it is reflected in their intellect and the power of humanity, willpower, thinking, imagination, intellectual actions showing emotion. Moreover, if we take into account that innovative thinking becomes a constant quality of personality, its outlook possibilities and social direction form the view on being, then the relevance of the research problem becomes more specific.

However, the choice of the topic of our research is due to the following contradiction:

- the need to train specialists of biologists capable of innovative thinking and the formation of the professionalism of a specialist in the groundlessness of theoretical and methodological approaches;
- innovative capabilities of future specialists and the lack of a unified system method in their implementation.

Therefore, the organization of the methodological foundations of innovative thinking and its effective use in the process of studying the discipline. In this regard, the problem of training highly qualified specialists capable of mastering the biological disciplines of plants anatomy and morphology, on the example of in-depth study of the anatomical and morphological structure of soybeans grown using drip irrigation technology, is considered from a scientific point of view, to provide their training scientific and methodological foundations that can organize the possibility of innovative thinking.

The need for technology development of a new approach of training based on the identification of the above contradictions, has identified the problem and the theme of the study «**The Formation of innovative thinking among future**

teachers of biology in the teaching of the subject of anatomy and morphology of plants».

Purpose of the research: Develop a methodological system in the teaching of the subject “Anatomy and morphology of plants” based on the formation of innovative thinking of future biologists and prove its effectiveness through a pedagogical experiment.

Object of research – system of professional training of future biology teachers in higher education institutions.

Subject of research – methods of forming innovative thinking of future biology teachers.

Research hypothesis: *if the theoretical foundations of the formation of innovative thinking of future biology teachers are defined, content-structural models are formed, if in the teaching of the discipline “Anatomy and morphology of plants” types, methods and techniques of forming innovative thinking are used, then the effectiveness of the training process increases and in the educational process activity in the development of scientific knowledge and skills of future teachers of biology is formed. Because, innovative thinking develops in the form of quality characteristics.*

Research tasks:

1. To clarify the psychological and pedagogical foundations of the formation of innovative thinking of future biology teachers;
2. To create a structural and informative model of the formation of future biology teachers’ innovative thinking, to determine its criteria and indicators, levels;
3. To determine the theoretical basis for the formation of innovative thinking of future biology teachers in the tuition of the discipline “Plant anatomy and morphology”;
4. To test the effectiveness of the methods of the formation of future biologists’ innovative thinking through a pedagogical experiment, to introduce it into the educational process.

Research methods:

- *theoretical* (conclusion of the research results by comparative analysis of biological, philosophical, psychological and pedagogical, scientific and methodical literatures);
- *empirical* (questionnaire, conversation, observation, interview, analysis of educational and methodological documents (state standard, programs, textbooks), comprehension of advanced pedagogical practices, analysis, carrying out practical-experimental works;
- *statistical* (processing of research results from a mathematical-statistical point of view).

Methodical and theoretical bases of the research: philosophical knowledge of innovative thinking in the process of scientific knowledge and learning, theories and ideas about the formation of innovative thinking of future biology teachers, methodical and didactic views.

Sources of research: the work of scientists biologists, philosophers, teachers, psychologists, etc. on research issues; official documents of the Government of the Republic of Kazakhstan (laws, decrees, programs, concepts); regulations of the Ministry of Education and Science regarding education in higher education institutions and educational-methodical complexes, model curricula, textbooks, teaching aids, electronic teaching aids; research practices.

Scientific novelty and theoretical significance of research:

1. The psychological and pedagogical foundations of the formation of innovative thinking of future biology teachers have been determined;
2. In the process of teaching the discipline “Anatomy and morphology of plants”, the methodological foundations of the formation of innovative thinking of future biology teachers were determined;
3. A structural-content model of the formation of innovative thinking of future biologists has been developed and criteria and indicators have been defined.

The practical significance of research:

1. An elective program of the discipline “Anatomy and morphology of plants” was developed, an educational and methodological complex and introduced into the educational process.
2. An educational-methodical manual was prepared on the topic: “Effective formation of students’ innovative thinking in teaching biology”.
3. The effectiveness of the methodology for the formation of innovative thinking of future biology teachers during the teaching of “Plant anatomy and morphology” has been tested and introduced into the educational process.

The research results can be used in scientific research conducted in this direction in the future, as well as future teachers in the teaching process and in practice.

The accuracy and validity of the study are proved by the methodological and theoretical bases, the correspondence of the content of the research work with scientific information, the use of research methods appropriate to the research tasks, the reasoning of the research information, the planned periodicity of practical and methodical works, the effectiveness of the recommended technology of the project, the conclusion of the results of the initial and final indicators and testing their effectiveness through practical and methodical work.

The main provisions for the defense:

1. The psychological and pedagogical foundations of the formation of innovative thinking of future biology teachers have been determined;
2. Structural-content model of the formation of innovative thinking of future biologists has been developed, criteria and indicators, levels have been determined.
3. The theoretical foundations of the formation of innovative thinking of future biology teachers in the course of teaching the discipline “Anatomy and morphology of plants” were defined;
4. The effectiveness of the methods for the formation of innovative thinking of future biologists through a pedagogical experiment has been tested, introduced into the educational process.

Base of research. Practical and experimental work was carried out at the State Women's Teacher Training University, the Department of Biology of Natural Sciences, the Scientific Research Institute of Kazakh Agriculture and Plant Growing, Virginia Polytechnic Institute and State University.

Discussion of the research results and its implementation.

On the content of the thesis 20 scientific papers have been published. Recommended by the Ministry of Culture and Science of the Republic of Kazakhstan and the Committee in the field of science control – 6, in journals of the databases Web of Science and Scopus – 1, in materials of international conferences – 9, in materials of foreign conferences – 3.

In particular, scientific papers were published in the list of the Ministry of Science and Technology of the Republic of Kazakhstan and the Committee in the field of control of science: “Bulletin of NAS RK” (biological and medical series, 2015); “al-Farabi KazNU Bulletin” (Biology series, 2015); “al-Farabi KazNU Bulletin” (Ecology series, 2015) and in various international conferences received positive feedback. United States (3rd International Scientific Conference «Theoretical and Applied Sciences in the USA», New York, 2015); Czech Republic (International scientific conference: «Continuity of education levels: contents, management, monitoring», Prague, 2015); United Arab Emirates (International Scientific and Practical Conference «World Science», Scientific Issues of the Modernity, Dubai, 2015).

In national and international conferences:

In the materials of the scientific and practical conference titled «Modern Botany: Biodiversity, Bioresources, Biotechnology» November 27-28 (Karaganda, 2014); II International readings of Farabi, in the program of the international conference of students and young scientists under the title «Farabi World», April 14-16 (Almaty, 2015), KazSWTTU, in the materials of the international scientific-practical conference «Specially Protected Natural Territories and Biodiversity», 28 May (Almaty, 2015); in the materials of the international scientific-practical conference «Modern education: methodology, theory and practice», TarSPU (Taraz, 2018); in the «Bulletin of KazNPU», a series of natural and geographical sciences (Almaty, 2014, 2015); «Bulletin of KazSWTTU», a series of Natural sciences (Almaty, 2014); Actual Biotechnology (Russia, Moscow, 2016); «Biosciences Biotechnology Research Asia», (India, 2016).

Also 1 article published in the journals included in the Web of Science and Scopus databases Applied Ecology and Environmental Research (2017).

According to the results of the scientific research, the educational and methodological manual “Forming innovative thinking of students in the effective teaching of biology” (Almaty, 2016) was published and the elective subject “Plant anatomy and morphology” was discussed at the Department of Biology of the Kazakh State Women's Teacher Training University, introduced into the educational process of the specialty Biology – 5B011300.

The thesis's structure. The thesis work consists of introduction, three chapters, conclusion, list of references and appendices.