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ҒЫЛЫМИ ЖУРНАЛЫ

НАУЧНЫЙ ЖУРНАЛ  
Торайғыров университета

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<https://doi.org/10.48081/ZYOQ5879>**Zh. T. Tergenbayeva<sup>1</sup>, L. N. Karasholakova<sup>2</sup>, N. Amangeldi<sup>3</sup>**

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## **FORMATION SUBJECT COMPETENCES OF TEACHERS ON EXAMPLE OF SUBJECT OF BIODIVERSITY**

*The article discusses the use of training on individual learning trajectories, group work, the ability to actively participate in group work, identification of effectiveness in group work as methods and means of forming subject competence in teaching plant biodiversity at the NAO East Kazakhstan University of S. Amanzholov. Using the example of a lesson on the topic «Methods of plant biodiversity conservation», an analysis of the biological knowledge of 2nd-year students 6B0150 - Biology was made, individual and group forms of education were used, where guide cards (maps of an individual theoretical or practical route) were effectively used; differentiated tasks in the form of test control (options for minimum, general, high and advanced levels); many variations of independent work (on four levels of complexity) for students to choose from. Optimal and effective methods for the formation of subject competence have been identified.*

*Keywords: competence, competence, teaching methods, test technology, group form of training.*

### **Introduction**

At present, in order to implement the educational process at school, a modern teacher must have a certain set of qualities. These qualities are common to all subject teachers, but the competencies of a biology teacher should be different from others. In this regard, we consider the main direction of the work of a biology teacher at school to be the development of his professional competence, which will help him skillfully organize the activities of students, transfer to students a

certain amount of knowledge to master their abilities for active action. In this case, a special role is given to clarifying the general structure of the professional competence of a biology teacher by highlighting its main components.

It is clear that in the context of training profiles, great importance is attached to the future teacher-biologist. The professional activity of a biology teacher provides students with knowledge for solving modern problems of life, the formation of a natural-science picture of the world and the correct ecological behavior in nature, the rational use of natural resources, mastering hygiene literacy, organizing a healthy lifestyle. Analysis of scientific and pedagogical sources shows that scientists A. Alekseeva, A. Babenko, N. Bibik, L. Biryuk, and others dealt with the issues of the structure of professional competence.

Modern society needs educated people who are able to make responsible decisions independently in a situation of choice, mobile, dynamic with a sense of responsibility for the fate of the country. In this regard, one of the main tasks, along with the formation of a harmoniously developed personality, is the task of forming the subject competence of students. The definition of a graduate who has competencies, that is, what he can do, what kind of activity he has mastered, what he is ready for, is called a competence approach.

The changes taking place in modern education suggest new approaches to the organization of the entire educational process, the qualities of a person who must be prepared and versatile, able to independently solve tasks, find optimal solutions to problems, put forward innovative ideas, propose innovative projects and successfully implement them in life (Ilyazova, 2008) [1].

New demands of society determine the preparation of schoolchildren of appropriate levels in the education system, which is reflected in the state mandatory standards of education, the state program for the development of education of the Republic of Kazakhstan for 2011-2020, and in the strategy «Kazakhstan-2050», as well as other state documents defining the strategic ways of development of the country (GOS, 2006) [2].

Subject competence plays a leading role in determining the quality of educational research. With regular use in educational and practical work, the formation of scientific competence will be successful. Only in this case, when teachers pay maximum attention to all necessary actions, the level of knowledge of students will reach a high level. (Kalegina, 2006) [3].

Subject competencies are primarily related to specific knowledge, skills and abilities specific to the subject being studied.

The **purpose** of the study is the theoretical justification, development and experimental verification of the effectiveness of the formation of the subject competence of future biology teachers in the conditions of modern education.

**Research objectives:**

- to reveal the essence of the concept of «subject competence»;
- to consider the pedagogical conditions of the production process in the formation of key subject competencies;
- to consider the formation of the subject competence of students in biology lessons.

**The object** of research is the educational process in the NAO of the East Kazakhstan University of S.Amanzholov.

**Research methods:**

- logical (historical approach and logical analysis, modeling, comparison, generalization),
- scientific (pedagogical control, pedagogical practice, study of pedagogical experience),
- individual (structural analysis of chemical knowledge, skills of rapid analysis and integration of the topic, etc.),
- organizational, empirical methods.

Kazakhstan Education has defined a new education strategy focused on personal development and involving the formation of competencies not only key, but also subject – the willingness of students to use their knowledge, skills and abilities in real life (Kuznetsova, 1989) [4].

Today, people who are capable, with an active position, who are able to think systematically, analyze, compare, draw their own conclusions, as well as practically solve life and professional problems that arise in front of them, are in demand (Smorodina, 2016) [5].

In the course of teaching, teachers are obliged to organize students to fulfill various «life roles». The main ones are: a realized person, a person with the zeal of helping other people, a person who is tuned into a continuous theory, a dynamic member of a civilized formation, a qualified employee, an intensive, trained native, a lawyer located around the sphere (graduate form) [6,7].

In a study at this university, 2-year students, where doctoral students of our university had their practice, tried to form the competence that would give some impetus to the formation of personal qualities in students.

Applying various methods in their practice, they tried to build the lesson so that it was meaningful, using methods and techniques that, without causing overload of students, would be fully realized for the purposes of the lesson.

We used the most widely used methods: active and interactive teaching methods (Guzeev, 2002) [8].

**Interactive method.** Interactivity («Inter» – mutually, «act» – to act) means to interact, to be in a conversation mode, a dialogue with someone. Interactive

methods, in contrast to active methods, are aimed at broader interaction with the teacher, as well as with each other, here the activity of students in the educational process is a priority.

### **Discussion**

#### *Lesson topic: Methods of plant biodiversity conservation*

The map of vegetation of Kazakhstan is distributed to students. Students are divided into 5 groups by regions of Kazakhstan (north, east, west, central, south). Each group has the task of representing its plant species, that is, what plants are in this region and how they grow. Students use textbooks, handouts, or the internet to search for information. Groups are given 10-15 minutes to prepare information. After the passage of time, students present their data. Each group talks about their industry, and at the end we summarize and ask each other questions about the plant species.

At the end of each lesson, we check the knowledge and consolidate the past topic. The most optimal and effective way to test knowledge was the method of choice.

In this case, the knowledge check is through «True and False». The check will take a maximum of 5 minutes, as it will be in oral form. Students have prepared cards with the image of «T», «F» on the tables. On the interactive whiteboard, students are shown statements in turn (10 statements) and students raise the card «True» or «False».

In this way we test the knowledge covered in this lesson.

#### Lesson topic: Plant Biodiversity

In today's lesson, students will mostly work independently.

They are given a task in the form of a table in which plants (3 plants) and questions are indicated:

- 1 The concept of biological diversity.
- 2 The systemic concept of biodiversity.
- 3 Modern directions of research in the field of biodiversity.

International research programs for the conservation of biodiversity.

- 4 Levels of biological diversity. Genetic, species, ecosystem diversity.

During the work, the laboratory assistant demonstrates a sample of plants to students. This is a kind of maneuver in order to draw attention to the fact that plant biodiversity is important.

During breaks we ask students questions:

- 1 Species diversity. Species as a universal unit of biodiversity assessment.
- 2 Ecosystem diversity. Assessment of ecosystem diversity at the global, regional, and local levels.
- 3 Taxonomic and typological diversity.

#### 4 Biochorological units of biodiversity assessment.

Continuing the lesson, we distribute individual tasks for students: We distribute A4 sheets to students and using the «One extra» method (which is the odd one out?). The attention of students is alternately provided with pictures with the names of metals. Students should determine which conservation method is suitable for these plants, and which plants are superfluous, i.e. does not correspond to the conservation properties.

For example, which of these plants is «superfluous»: rosehip, ferns, mosses, dill? The correct answer is rosehip because they have the properties to preserve. Students should write down the answer on a piece of A4 paper, which plant is «superfluous». All students simultaneously raise white mini-boards, and the teacher records their answers. Quantity: 10 tasks. The task is designed for 10 -15 minutes.

Individual task for students:

For each student, the plants were spoken and asked, according to which they should write down the methods of preserving this plant.

During this exercise, they recall some actions. And also work out the dependence of changes in the basic properties of plants on the ecosystem.

Task 1: students must fill out a table in which they must determine the conservation methods of each plant. Task 2: Students are given a worksheet with questions and tables on the biological properties of plants.

Ask students to answer the questions:

1 Problems of biodiversity conservation related to the introduction and invasions of species.

2 Natural factors of territorial differentiation of biological diversity.

The main task is performed by students independently. After completing the task, students discuss their conclusions.

The teacher identifies students who have not been able to achieve the goal in order to develop further individual trajectory of students.

The study revealed for each form the effectiveness of using:

Table 1

Criteria	Indicator	%		level	
		1 group	2 group	1group	2 group
1. The ability to navigate the material	Knowledge of «terms»	80	60	high	average
	Ability to work with terms	75	50	high	low
	Knowledge of «content»	80	60	high	average
	Ability to work with content	80	55	high	average

1. The ability to work with biological text	Knowledge of the concept	80	60	high	average
	The ability to use biological terms	80	60	high	average
	Knowledge of the concepts of «Biology», «Biodiversity», «plants». «saving»	80	60	high	average
	The ability to distinguish classes of endemic plants when composing certain classes	80	60	high	average
	Knowledge of the concept of «methods of saving biodiversity»	80	60	high	average
	Ability to distinguish classes of plants	80	60	high	average

– In the group form of work, the use of guide cards (maps of an individual theoretical or practical route);

– With differentiated tasks in the form of test control (options for minimum, general, high and advanced level); many variations of independent work (on four levels of complexity) for students to choose from.

The use of test tasks contributes to the development of information competence (the ability to search, analyze, transform, apply information to solve problems). Working on test technology, thanks to the use of modern electronic textbooks, virtual chemical laboratories, the Internet, new teaching tools using ICT are very popular, the role of the teacher in this case is a coordinator-consultant [9].

Thus, the effective use of all the proposed forms and types of training makes it possible to identify indicators of formulated subject competencies, as well as to detect individual details and characteristics of their manifestation in specific types of educational activities. Consequently, both in the classroom and in extracurricular activities of students, it is possible to carry out the process of forming subject competencies.

Based on this, I compiled a table of the level of formation of subject competence in biology lessons for 2nd year students.

General educational skills are ways of obtaining information about the world around us, studying students in the context of personality formation (i.e., the ability to work with educational and scientific biological, psychological, pedagogical and methodological literature). Project skills provide the strategic goals of professional and pedagogical activity:

– the ability to choose the content of educational material in accordance with the learning objectives, age and individual characteristics of students.



Project skills are aimed at mastering a number of special skills necessary for teaching the course «Biology» at school, and to be specific, these are:

- observe, investigate, describe, characterize, compare, determine biological objects and phenomena, evaluate, experiment and predict;
- to connect biological knowledge with understanding: the phenomena occurring in living matter (physiological and biochemical processes), the unity of hereditary information, the evolutionary development of the organic world, the complexity of the relationship of natural components, practice;
- independently study topical issues of modern biology and find out the problems of the development of biological science

Of particular importance in this case are the diagnostic skills of the teacher, this is the use of various diagnostic methods and an objective assessment of the state of the biological preparation of students. Methodological and technological skills provide the teacher with the choice of effective methods, techniques and teaching aids, the development of calendar-thematic plans and lesson plans, the introduction of innovative pedagogical technologies into the educational process of the school.

Priority for a biology teacher are organizational skills related to the specifics of teaching subjects of the biological cycle - organizing and conducting study tours, field training, research activities in the field. The personal-reflexive component involves the development of the subject's qualities that affect the effectiveness of the performance of professional activities: the teacher's awareness of the norms, rules, models of the teaching profession, the relationship with the professional standard, the formation of a positive psychological position. Reflection dominates among other components and plays a leading role in the implementation of the personal component of the process of forming the professional competence of a future biology teacher.

The issues of reflection in the structure of pedagogical activity are studied by V. Vasiliev, T. Davydenko, E. Kuzmina, L. Mitina and others. Thus, E. Kuzmina notes that reflection provides a search for personal meaning as a way to overcome obstacles in the system of activity [11]. L. Mitina characterizes pedagogical reflection as a professionally significant property of the personality, which is included in the group of the teacher's reflexive-perceptual abilities [11].

An analysis of scientific approaches to studying the content of a teacher's professional competence shows that many scientists consider reflection from different positions. Thus, reflection is understood as:

- a separate property of the individual;
- pedagogical skill;
- functional component of pedagogical activity;

– a manifestation of the professional self-awareness of the teacher, the principle of organizing pedagogical activity, etc.

In our work, reflection is considered as a separate property of personality. The result of reflection can be personal development, the formation of subjectivity as a creative attitude to the life path. Reflection is a source of inner experience, a way of self-knowledge of one's own professional activity and its differentiation from the activities of others. In other words, the function of reflection is to stimulate the process of professional identity of the biology teacher's personality. Thanks to reflection, the teacher can realize not only the limits of his own professional experience, but also determine its value for himself and the pedagogical community.

The peculiarities of a teacher's professional activity pose a number of requirements for future teachers, which are defined in pedagogical science as professionally significant personal qualities. In modern pedagogy, attempts are being made to highlight the essential qualities of a teacher in terms of the effectiveness of pedagogical activity. It is legitimate to single out precisely the dominant qualities, the absence of which makes it impossible for effective pedagogical activity. L. Yasyukova identifies three groups of personal qualities that two teachers have professional significance:

– the development of empathy, i.e. the ability to understand the inner world of another person and penetrate into his feelings, empathize;

– the ability to actively influence the student – the dynamism of the individual, which manifests itself in initiative, flexibility, a variety of influences and in the ability of the teacher to catch changes in the situation and think through the necessary strategy of pedagogical influences in connection with them;

– as opposed to dynamism and the ability to «own others», the teacher must have a highly developed ability to «own oneself» [11].

Thus, each teacher should be characterized by creativity and responsibility, initiative and social activity, reflection. The dominant quality for a teacher is humanism, i.e. attitude to each individual as the highest value. Humane relations are made up of interest in the personality of the student, helping the student, respect for his opinion, combined with high demands on his educational activities, concern for his development. The communicative subsystem acts as an integrative subsystem of the teacher's professional qualities. It is the communicative subsystem that manifests itself in the form of a prism, through which all other professional functions are transformed and all subsystems of the teacher's professional qualities are regulated.

### **Conclusion**

The results obtained in the study led to the conclusion that subject competence is the ability of a student to apply knowledge, skills, practical experience and to

show personal qualities through consistent educational actions that are aimed at solving the tasks of educational and cognitive activity of the studied subject. We have established that the main subject competencies focused on ensuring the effective organization of the development of the content of subject knowledge are the ability to plan educational and cognitive activities. The implementation and regulation of educational activities in accordance with a given goal, the collection and processing of information from various sources, the mastery of scientific terminology, key concepts, the transformation and application of new knowledge in educational and educational-project situations, monitoring, evaluation, analysis and reflection of educational and cognitive activities contributes to the formation of subject competencies.

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## **ПӘННІҢ БИОӘРТҮРЛІЛІГІНІҢ МЫСАЛЫНДА МҰҒАЛІМДЕРДІҢ ПӘНДІК ҚҰЗЫРЕТТІЛЕРІН ҚАЛЫПТАСТЫРУ**

*Мақалада оқытуды жеке оқыту жолдары бойынша пайдалану қарастырылады, топтық жұмыс, топтық жұмысқа белсенді қатысу мүмкіндігі, С. Аманжолов атындағы Шығыс Қазақстан университетінде өсімдіктердің биоалуантүрлілігін оқытуда пәндік құзыреттілігін қалыптастыру әдістері мен құралдары ретінде топтық жұмыстың тиімділігін анықтау. «Өсімдіктердің биоәртүрлілігін сақтау әдістері» тақырыбы бойынша сабақ үлгісі негізінде 6B0150 – Биология 2 курс студенттерінің биологиялық білімдеріне талдау жасалды, оқытудың жеке және топтық формалары пайдаланылды, мұнда нұсқаулық карталар (жеке тұлғаның карталары) пайдаланылды. Теориялық немесе практикалық бағыт) тиімді пайдаланылды, тесттік бақылау түріндегі сараланған тапсырмалар (ең төменгі, жалпы, жоғары және жоғары деңгейге арналған нұсқалар), студенттердің таңдауы үшін өзіндік жұмыстың көптеген нұсқалары (төрт қиындық деңгейінде). Пәндік құзыреттілікті қалыптастырудың оңтайлы және тиімді әдістері анықталды.*

*Кілтті сөздер: құзыреттілік, құзыретті, оқыту әдістері, тест технологиясы, топтық оқыту.*

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## **ФОРМИРОВАНИЕ ПРЕДМЕТНЫХ КОМПЕТЕНЦИЙ ПЕДАГОГОВ НА ПРИМЕРЕ ПРЕДМЕТА БИОРАЗНООБРАЗИЕ**

*В статье рассматриваются использование обучения по индивидуальным траекториям обучения; работа в группах; способность активно участвовать в групповых работах; выявление эффективности в групповых работах как методы и средства*

*формирования предметной компетентности при обучении биоразнообразия растений в НАО Восточно-Казахстанский университет имени С. Аманжолова. На примере урока по теме «Методы сохранения биоразнообразия растений» сделан анализ биологических знаний учащихся 2 курса 6В0150 – Биология, применен индивидуальный и групповые формы обучения где эффективно был использован карточки-путеводители (карты индивидуального теоретического или практического маршрута); дифференцированных заданий в виде тестового контроля (варианты минимального, общего, высокого и продвинутого уровня); много вариаций самостоятельных работ (по четырем уровням сложности) на выбор учащихся. Выявлены оптимальные и эффективные методы для формирования предметной компетенции.*

*Ключевые слова: компетенция, компетентность, методы обучения, тестовая технология, групповая форма обучение.*

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