

Zh.Zh. Zhumagaliyeva<sup>1</sup>, Sh.K. Eleupaeva<sup>2</sup>, B.P. Chernik<sup>3</sup>

<sup>1</sup>*Ye.A. Buketov Karaganda State University, Kazakhstan;*

<sup>2</sup>*L.N. Gumilyov Eurasian National University, Nur-Sultan, Kazakhstan;*

<sup>3</sup>*Novosibirsk Center for Continuing Business Education, Russia  
(E-mail: a\_a\_shynar@mail.ru)*

## Methods of organization of cognitive activity of pupils in biology lessons

Contemporary and effective pedagogical technologies used in the work of general educational institution are considered in the article. Relevance of the use of contemporary innovational technologies in the action of general educational institution is justified. The article is devoted to the issue of using new innovational technologies. According to the use of technologies in the process of general educational institution attention is paid to the direction of possibility to projecting of educational process on the basis of pedagogical technology, effective use of new methods and forms of organizing the study, motivating of the pupils to cognitive action, increase of their activity, full mastering of given educational material. The use of new innovational technologies in educational process is one of the important feature of developing and modernizing educational process. New methods give the possibility to the cognitive function of pupils to be active; provide motivation for study; provide high level of analyzing exercises; improve knowledge, skills and observation. Effectiveness of using new innovational methods is related to electronic resources, usage of ways and objects of these technologies, corresponding to working methodology of the teacher. Developmental level indicators of emotional-motivational and cognitive components in forming biological knowledge of the pupils were defined and the review on the results of pedagogical experiment was made.

*Keywords:* innovative technologies, emotional, motivational, cognitive components, dynamic indicators.

One of the major issues of pedagogical science is to develop cognitive activity of the pupils, their intellectual ability and to give the freedom to the pupil. At the school age of the children, when all their possibilities are developed harmoniously, stepped on the big way of life, their function would be meaningful and comprehensive.

The main characteristic of school education is focused on realization of all opportunities of the pupils, self-development and personal qualities.

At the lesson, the main component of the methodology according to new technology is developmental teaching. The main goal is to form comprehensively developed individual. To do this, the teacher must be innovative and creative. Many foreign and Kazakh pedagogical technologies are being introduced in the current educational process. In addition to being interested in the subject, there is a sufficient number of methods to educate the pupil, to think seriously and search independently.

Nowadays, it is necessary to create conditions for the pupil to be able to choose a future career through a variety of activity including the ability to self-assess. One of the actual issues of present day is the formation of competitive individuality that contributes to the improvement of life. In this connection, each teacher has the following requirements for the pupil and should influence on its implementation [1]. These requirements include: activity action, social responsibility, broad range of thinking, literacy and priority of interest towards cognitive activity.

The above mentioned personal abilities are not developed themselves, but requires pedagogical conditions. The cognitive activity of each individual is the process of continuation. That's why, the education of pupils at school is the basis for developing future self-education and self-education of himself. Finding the effective ways to prepare the pupils for continuous education is one of the actual problems.

The awareness of the pupil's cognitive interest in every subject in the classroom creates such qualities as active search and research. By stimulating pupils' interest in the subject, we would increase their active creative abilities. The main task of the teacher is to educate the children to work with their cognitive activity. The core of cognitive interest is a process of thinking. The following types of work can be used to increase pupils' intellectual thinking and interest.

1. Tasks in the form of game for the development of logical thinking.
2. Tasks in the direction of investigation for free delivery of his opinion.
3. Types of work aimed at transformation of given tasks.

It is important to develop pupils' self-esteem, to increase their activity, to solve theoretical and educational problems in the subject, to use resourceful and cognitive games in organizing scientific research. The

use of game methods in the process of the lesson will allow the pupils to further improve their knowledge, deepen their understanding and increase their thinking abilities [2].

Educational-cognitive activity is an integral part of pedagogical process. The educational-cognitive activity includes the most important part of social phenomenon of the pupil in the pedagogical process: philosophy, sociology, psychology, pedagogy, philosophy of education, pedagogical psychology, etc. Organizing educational-cognitive activities of the pupils with sciences, knowledge systems, business skills, mental, physical, psychological processes researches the development of mind, memory, abilities, interpretation of concrete actions of implementing the action, the worldview and personal development ways, ways of formation.

The cognitive action is important for the general development of the pupil and formation of individuality. All the tendencies of the action under the influence of cognitive actions are developed.

Cognition requires not just the intensity of thinking, also the activeness of major tendencies of the action. For mastering the knowledge, work should be done, such as keeping, sequencing, clarifying, analyzing and generalizing. It can be considered as one of the main types of activity of the pupil, such as labor. Because, first of all, cognition is a world-wide tendency that represents the world of society. Secondly, the person knows definite thing and phenomenon through the cognitive action without opening the novelty.

Informative activity is the special phenomenon of the pupil's enthusiasm and diligence to study and know. In order to understand the new material of the teacher, the pupil needs to listen to him to extend his knowledge and to do the works as experiment. Because, it is impossible to be aware of the progress of given material in repeating consciously, in learning new knowledge and skills. That is to say, the activity of the pupil should be at all stages of the learning process. When cognitive activity of the pupil is developed during the lesson, the following elements of mental abilities will be developed: intelligence, observation, thinking and speech independence. Many works of poets, teachers and methodologists have been devoted to the development and formation of cognitive activity of pupils.

Biology-enhanced program requires each teacher to develop and enter the flexibility and skills of pupils through the provision of unity of education and upbringing, mastering the methodology of developmental learning, the implementation of interdisciplinary communication and teaching process optimization. Accordingly, at the lesson, we should bring the pupils to develop deeper, more accurate knowledge, skills and creative abilities [3].

In order to stimulate pupils' interest in the lesson, we need to properly select the form and method of teaching. The lesson would be very interesting and attractive with the use of pedagogical technologies in teaching biology. The lessons learned through innovative technology have been demonstrated in practice were an exciting, attractive and related to modern requirement.

In the control experiment, we observed that during the observation period, pupils were concentrated on the topic, understood and discussed. As a result, we have seen that there is a lack of new information, interactive teaching methods and pedagogical-psychological training that increase the pupils' interest in biological education. Therefore, we have chosen the technologies and techniques that can be used at the lesson with the participation of pupils.

At the biology lesson it is effective to use Zh. Karaev and Zh. Kobdikov's teaching methods called 'Three-dimensional methodical system' in the formation of cognitive activity of the pupils (intuition, perception, memory, thinking, conclusion, imagination, attention, skills) [4]. Nowadays, it is necessary to create conditions for the pupil to be able to choose the future specialty through the possibility of observing himself in different activities.

We have been organizing cognitive and interesting biological games such as adventures, anagrams, inwords, loto and various tasks and logic thinking, memory, mind and etc. to improve and develop pupils' cognitive activity and interest in biology lessons. The association method or the «Mind map» — the mind (thinking) map and if the illustration pictures have a lot of pictures in the tasks, more cognitive interest of the child will be increased. For example, a biological loto game can be created and used in all classes.

In the 9<sup>th</sup> grades, in order to develop their qualities such as logical thinking, mind, memory and others, cognitive games such as anagrams, inwords, loto games have been organized.

The aim of the pedagogical experiment is to increase pupils' cognitive activity and interest in studying biology lessons, in particular the chapter «Nervous system».

In the second part of our lesson, pupils were divided into five groups, explaining the purpose of each group, tasks were given in order to compare biological dictation, filling charts, essay writing, supporting drawings and venn diagrams.

The 9<sup>th</sup> grade pupils of Temirtau secondary school № 4 took part in pedagogical experiment. The lesson was conducted in two parallel classes. In particular, the work according to the method we created was conducted in 9 «A» and 9 «B». 9 «A» was an experimental class and 9 «B» class was a control class.

In this class, the teacher played a role of a consultant. All themes were mastered by pupils themselves. Only at the first lesson, the teacher gave the introductory material, drew attention to the complex questions. The same qualitative and quantitative composition of classes involved in the study was a good base for research. The 9 «A» class mastered themes themselves working on individual trajectory system.

Training sessions on playing the game «Tongue twister Bazaar» were used at the biology lesson. Pupils comprise vocabularies, secret words, crosswords and tongue twisters and they also solve as individual and collective at the lesson.

The problem of developing cognitive activity of the pupils requires the search of novelty in theory and practice. The value of each lesson is to encourage pupils to develop the spirit of studying, to motivate them, to read and organize their work according to the abilities of each pupil and transform the learning process into creative work. The following guidelines should be found in each teacher in promoting cognitive interest and active learning by providing pupils with profound knowledge.

Questions that determine the development level of cognitive component in the formation of pupils from biology:

1. Do you know about the features of spinal structure?
2. Can you say the white and gray substance of spinal cord?
3. How nerve impulses will be transmitted to muscle fibers?
4. How many types of connective tissue do you know in human body?
5. What is the main function of epithelial tissue?
6. What do you know about the composition and structure of bones?
7. Can you tell us about the role of the red bone in forming the blood?
8. Can you tell about platelets in blood clot?
9. Do you know about leukocytes?

10. Do you know the role of disease-causing microbes and viruses in the development of infectious diseases?

The pupils' response showed low level. For example, some pupils did not answer the specifics of spinal cord structure (24,2 %), did not pay special attention to the type of connective tissue (21,2 %), the chemical composition of the bone (14,2 %), the role of viruses in the development of infections (24,1 %) (Fig. 1).

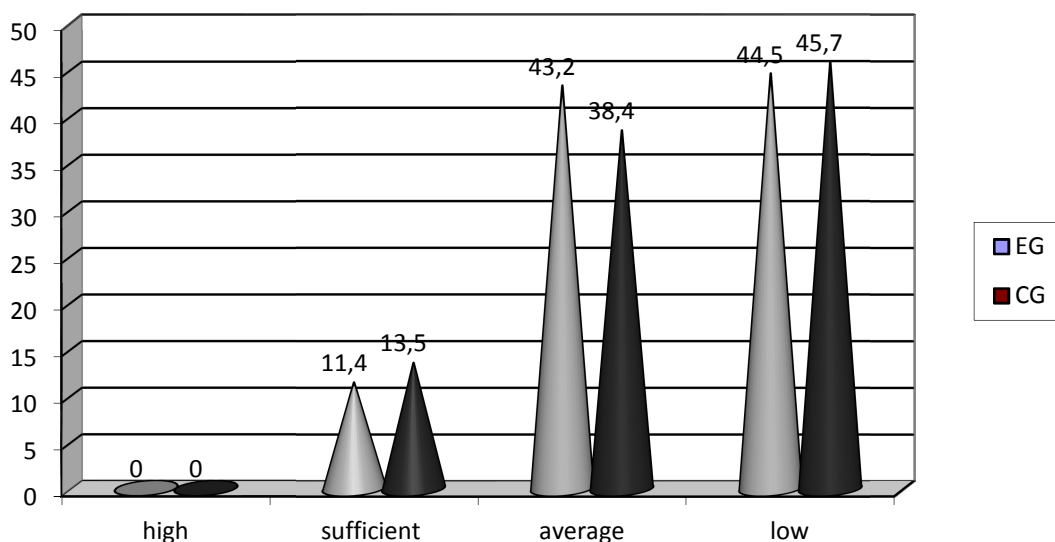


Figure 1. The indicators of development level of the cognitive component in the formation of pupils' biological knowledge (beginning of the experiment)

The picture shows a low level of cognition of many learners: If EG is at a sufficient level — 11,4 %, CG — 13,5 %, average level: EG — 43,2 %, CG — 38,4 %, low level: EG-44,5 %, CG — 45,7 %.

In order to stimulate pupils' interest in the lesson, the form of the lesson and innovative methods have been chosen. The lesson has been conducted and pedagogical technologies of biology are used in the learning process. Lessons learned through innovative technology have proved to be very interesting and attractive, as well as it has been used according to exciting and informative learning experience.

In the control experiment, we observed that during the supervision period, pupils were concentrated on the topic, understood and made discussion. As a result of the observation, we have seen that there is a lack of new information, interactive teaching methods and pedagogical-psychological training that increase pupils' interest in biological education.

The main requirement of biology lessons is to increase the quality of lesson by bringing the types and methods of learning into the cognitive and educational level. With this aim, I was always in the process of completing my studies with various techniques. According to the line with the requirements of modern time, I also try to organize my lesson using the newest way of methods.

At the last stage of experimental work, we have determined the level of cognition of pupils with the help of repeated questionnaire questions. The following is the result of these components (Fig. 2).

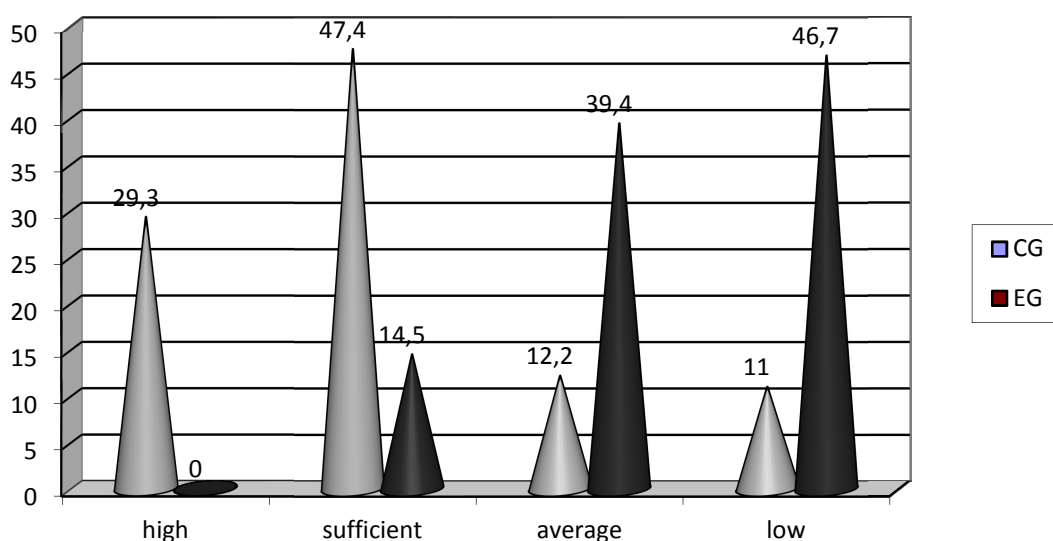


Figure 2. The indicators of development level of the cognitive component in the formation of pupils' biological knowledge (the end of the experiment)

The picture shows that the cognitive components of the pupils were good at the end of the experiment. For example, if at the beginning of the experiment there were no higher levels in the experimental group, then at the end their number reached 29,3 %, and if sufficient level was 3 times higher, the middle level is decreased by 3,1 times. Low level is decreased by 2,7 %.

During the conduction of the lesson, I use pupils on the basis of folk pedagogy, to increase pupils' interest in the classroom and use the effective teaching methods. The new types of lessons which I use will also be based on the content, goals, progress, excursion, fairy tales, games, competitive lessons and test methods.

As a result of complex experiments, the level of pupils' cognitive components has been increasing and innovative methods used in the lesson have been demonstrated. Also, the results of experimental studies showed that the level of education and creative thinking of pupils in experimental groups has been increased and the initial indicator in the control groups has been remained unchanged.

According to the new paradigm of education motivational-volitional component provides the enthusiasm of a pupil as a valuable guide to creative activity, interest to the news, the desire to find a solution of actual problem, the desire to voluntarily formulate their own creativity, the need for creativity of self-creation.

Determination of the level of emotional-motivational component of the formation of biological knowledge of the pupils was carried out on the following questions:

1. What do you know about leucocytes, their structure and function?
2. What do you know about how many mixed pairs of spinal cord nerves spread from spinal cord?

3. Do you know the specific features of the reflex?
4. Do you know ways of transmission of neuron impulse?
5. What types of skin functions do you know?
6. Can you tell us about the structure and services of the tissues?
7. What do you know about the internal structure of the bone?
8. What role does hemoglobin play in human organisms?
9. What can you say about immunity?
10. What do you know about the features of antigens and antibodies?
11. What do you know about the spread of nerve impulses of muscle fibers?

The level indicators of emotional components in the formation of biological knowledge of the pupils (Fig. 3) were determined at the beginning of experiments. The picture shows that in the experimental group and in the control group there is not any high level, sufficient level: EG — 19.5 %, CG — 20.3 %, medium level: EG — 44.3 %, CG — 43.4 %, low level: EG — 35.5 %, CG — 34.5 %, and it has been defined that their biological knowledge is low (Fig. 3).

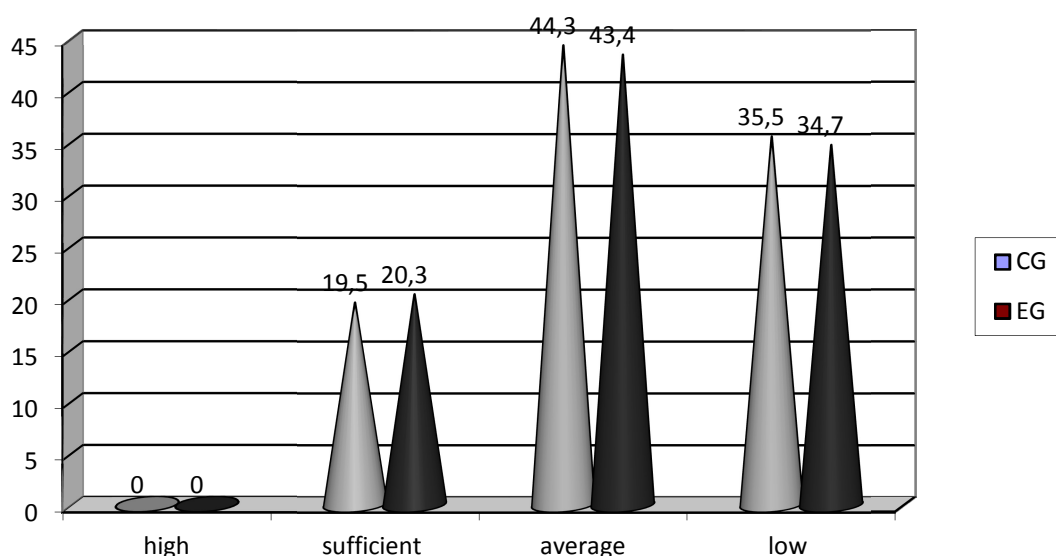


Figure 3. The indicators of development level of emotional components in the formation of pupils' biological knowledge (at the beginning of the experiment).

Thus, teaching technology requires the use of advanced classical pedagogy achievements, enriching it with the new techniques and organization of learning through the pupil's self-efficacy.

Therefore, in order to increase the pupils' knowledge, it is necessary to use new technologies in the classroom. Organization of special work: research work, preparation for implementing the methodology has been developed through the tasks of the pedagogical practice.

During the final control of experimental experiment work, we have identified the level of development of emotional components of the pupils with the help of repeated questionnaire questions. The following is the result of these components (Fig. 4).

The picture shows that the emotional components of the pupils showed a good result at the end of the experiment. For example, if at the beginning of the experiment there were no high levels in the experimental group, at the end their number reached 30,5 %, and the sufficient level is increased 2 times, while the middle level is decreased 3,2 times. At a low level it is decreased by 2,2 %.

The level of motivational component here indicates that the pupils have an interest to cognitive activity, the need for self-fulfillment and enthusiasm. Increasing the level of development of the motivational component influenced on development level of content-operational component.

There has been no significant change in the developmental (emotional-motivational, cognitive) components of pupils' biological knowledge components at the control group.

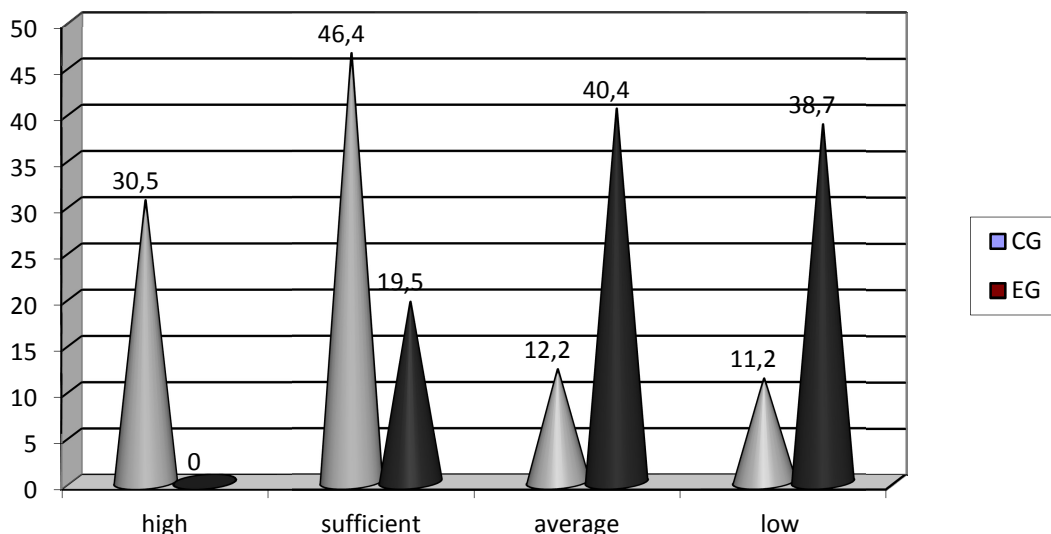


Figure 4. The indicators of development level of emotional components in forming the biological knowledge of the pupils (at the end of the experiment).

New technologies help pupils to improve their education quality, increase their possibility to work themselves and increase an interest to biology. The activity of the pupils in the implementation of new technologies, creative search and assessment of pupils' knowledge themselves play a decisive role in learning process.

Cognitive abilities are characteristic for everyone. It is only the responsibility of each teacher to develop it. Therefore, it is not only necessary to provide with ready-made information facts, laws and rules and it is necessary also to provide pupils with learning materials in order to conclude their knowledge. In addition, teaching is only effective if there is a collective relationship between the teacher and pupil, and respect for each other.

#### References

- 1 Мынбаева А.К. Современное образование в фокусе новых педагогических концепций, тенденций и идей: моногр. / А.К. Мынбаева. — Алматы: Раритет, 2005. — 90 с.
- 2 Тұрғынбаева Б.А. Дамыта оқыту технологиялары / Б.А. Тұрғынбаева. — Алматы, 2000. — 90 б.
- 3 Торманов Н. Биологияны оқытудың инновациялық әдістері / Н. Торманов, Н.Т. Абылайханова. — Алматы: Қазақ ун-ті, 2013. — 258 б.
- 4 Қараев Ж.А. Технологиялық тәсіл негізінде педагогикалық жүйені жаңартудың өзекті проблемалары / Ж.А. Қараев, Ж.У. Көбдікова. — Алматы: Жазушы, 2005. — 200 б.

Ж.Ж. Жұмағалиева, Ш.К. Елеупаева, Б.П. Черник

### Биология сабағында оқушылардың танымдық іс-әрекетін ұйымдастыру тәсілдері

Мақалада жалпы білім беру мекемелерінде қолданылатын заманауи педагогикалық технологиялар қарастырылған. Сонымен қатар жалпы білім беру мекемелерінің қызметінде заманауи инновациялық технологияларды пайдаланудың өзектілігі негізделді. Мақала жаңа инновациялық технологияларды пайдалану мәселесіне арналған. Жалпы білім беру мекемелеріндегі оқыту үрдісін технологияландыруға сәйкес оқытуды ұйымдастырудың жаңа әдіс-тәсілдері мен формаларын тиімді пайдалануға, оқушылардың танымдық іс-әрекетке ынталандыруға, олардың белсенділігін арттыруға, берілген оқу материалын толық меңгеруге, сонымен қатар оқу үрдісін педагогикалық технология негізінде жобалауға қолжеткізуге болатын мүмкіндік бағытына назар аударылған. Оқу үрдісінде жаңа инновациялық технологияларды қолдану оқу үрдісін жетілдіру мен оңтайландырудың маңызды қырлары бірі болып табылады. Мақалада келтірілген жаңа әдістер оқушылардың танымдық қызметін

белсендендіруге мүмкіндік береді: оқу үшін оңтайлы ынталандыруды қамтамасыз ету; жаттығуларды саралаудың жоғары дәрежесі; білімді, дағдыларды және бақылауды жақсарту. Жаңа инновациялық әдістерді пайдаланудың тиімділігі осы технологияларды қолдану жолдары мен нысандарына, мұғаліммен онымен жұмыс істеу әдіснамасына қаншалықты сәйкес келетініне пайдаланылатын электронды ресурстарға байланысты. Мақалада оқушылардың биологиялық білімін қалыптастырудағы эмоциялық-мотивациялық және танымдық компонентінің даму деңгейлік көрсеткіштері анықталып, педагогикалық тәжірибенің нәтижелеріне шолу жасалған.

*Кілт сөздер:* инновациялық технологиялар, эмоциялық, мотивациялық, танымдық компоненттер, динамикалық көрсеткіштер.

Ж.Ж. Жумағалиева, Ш.К. Елеупаева, Б.П. Черник

## Методы организации познавательной деятельности студентов на уроках биологии

В статье рассмотрены современные эффективные педагогические технологии, используемые в работе общего образовательного учреждения. Обоснована актуальность применения современных инновационных технологий в деятельности общего образовательного учреждения. Статья посвящена использованию новых инновационных технологий в образовательном процессе школы. Особое внимание уделено эффективному использованию новых методов и форм в учебном процессе в общеобразовательном учреждении, что повышает активность школьников, стимулирует организацию познавательной деятельности. Такой подход повышает качество владения учебным материалом, учебным процессом, проектирования образовательного процесса на основе современных педагогических технологий. В преподавании использование новых инновационных технологий является одним из важнейших аспектов совершенствования и оптимизации учебного процесса. Перечисленные в статье средства, новые методы позволяют активизировать познавательную деятельность учеников, обеспечить положительную мотивацию обучения, высокую степень дифференциации обучения, усовершенствовать контроль знаний, умений и навыков. Эффективность применения новых инновационных методов зависит от способов и форм применения этих технологий, от того, насколько грамотно преподаватель владеет методикой работы с ними, от используемых им электронных ресурсов. Описан уровень развития эмоционально-мотивационно-познавательной составляющей формирования биологических знаний, умений и навыков у учеников. В работе представлены результаты педагогического эксперимента, проведенного в период прохождения педагогической практики в школе.

*Ключевые слова:* инновационные технологии, эмоциональные, мотивационные, когнитивные компоненты, динамические показатели.

### References

- 1 Мынбаева, А.К. (2005). *Sovremennoe obrazovanie v fokuse novykh pedahohicheskikh kontseptsii, tendentsii i idei [Modern education in the focus of new pedagogical concepts, trends and ideas]*. Almaty: Raritet [in Russian].
- 2 Turgynbaeva, B.A. (2007). *Damyta okytu tekhnolohiialary [Pedagogical tehnologi]*. Almaty [in Kazakh].
- 3 Tormanov, N., & Abylaikhanova, N.T. (2013). *Biolohiiany okytudyn innovatsiialyk adisteri [Innovative methods of teaching biology]*. Almaty: Kazak universiteti [in Kazakh].
- 4 Karaev, Zh.A., & Kobdikova, Zh.U. (2005). *Tekhnolohiialyk tasil nehizinde pedahohikalyk zhyieni zhanartudyn ozekti problemalary [Actual problems of modernization of pedagogical system on the basis of technological approach]*. Almaty: Zhazushy [in Kazakh].