

EFFECTIVENESS OF STUDENTS IN RESEARCH ACTIVITIES IN TEACHING BIOLOGY

Atakulova Manzura Nematovna
Senior Lecturer of Navoi State Pedagogical Institute

ABSTRACT

The article reveals various forms and methods of increasing students' interest in knowledge by directing students to research activities, as well as the content and methods of studying the level of development of students' research activities and components of orientation towards research activities.

Keywords: apprentice, Scientific research, scientific creativity, method, express, cognitive, component, reflective.

INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

Orientation of young people to research activities in higher education institutions around the world, training of highly qualified personnel in the field of education, their independent scientific and creative approach to each type of activity, development of competencies to apply innovations, integration of science, education and industry, as competent personnel Preparation for scientific and methodological activities is of great importance. Involvement of students in scientific work, independent research activities, the application of the results of experiments in practice creates a solid foundation for the training of independent, potential, creative research and teaching staff and poses a number of challenges.

In carrying out these tasks, first of all, it is necessary to seriously organize the work of scientific and design circles in higher education, to work with gifted students, not only to study and analyze theoretical data, but also to develop innovative approaches to experimental experiments. should. To do this, special attention should be paid to the development of independent learning of students.

Another important requirement of the education system is the continuous development of the individual throughout his life as a subject of the educational process. Opportunity for creative development, independent learning, self-development is an important aspect of the educational process.

There are different forms and ways to increase students' interest in learning by focusing on research activities in biology classes. Based on the content of the educational process, the main purpose of the use of research-oriented tasks in biology lessons is to increase students' interest in biology.

In order to achieve this goal, it is necessary to solve the following tasks: 1. To study the theoretical material using the technology of organizing research activities in biology classes; 2. Creating conditions for the activation of cognitive activity; 3. Develop students' interest in learning in biology classes through research activities; 4. Formation and development of research, inquiry, knowledge and thinking skills in students.

The implementation of these tasks in the process of biology education is organized directly on the basis of the following tasks.

Orientation of students to research activities is carried out gradually. Initially, "We invite nature to the house", "Onion - a green friend", "Pharmacy in front of the window" and others. Students will learn about the importance of houseplants in human life. "Landscape of the Tashkent region" allows students to identify annual and perennial species of ornamental plants in parks, on the territory of the university, in field practice. Also, projects, laboratories, observations and experiments on landscaping, improvement of the ecological situation, play an important role in the development of student research activities.

At the initial stage, the pedagogical conditions for the formation of students' readiness for research activities are problem-based learning technologies, as research activity is creative (productive) and its purposeful formation occurs in the process of searching for learning activities. This, in turn, is a leading activity in problem study. One of the main tasks of problem-based learning is the development of theoretical thinking processes (analysis, synthesis, generalization, definition, abstraction, comparison, similarity) and these processes are a key component of research activity skills.

The main problem of teaching is to create a problem situation, in the process of solving this situation, students form ideas about the logic of scientific knowledge and research methodology, which helps to form the focus, activity and motivational components of students' research activities.

Problem-based (brainstorming) lessons and debating lessons (scientific discussion and free thinking), which play an important role in the educational process, are based on problem-based learning technology [142,77-p].

The specificity of these lessons is based on the problematic situations created during the lesson.

Problem-based learning is a process aimed at developing students' thinking skills and satisfying their cognitive needs in the process of acquiring knowledge, based on the laws of reasoning, using the most alternative form of pedagogical influence by the teacher [5, p. 156.].

A problematic situation increases and stimulates a student's cognitive needs. In the process of creating and solving problem situations, students' interest in and need for knowledge of research activities increases. During problem solving, students learn methods such as the ability to think logically, to distinguish between the main and secondary features of events, processes, to establish a cause-and-effect relationship between them, to choose one or another sentence, to draw conclusions, to assess the accuracy of the application of new knowledge and methods of action in new situations. The mentioned processes form the basis of research activity on the basis of theoretical thinking. Consequently, working in a problematic situation allows students to prepare for research activities.

Materials collected by students in the process of studying and analyzing the scientific literature provide an opportunity to participate in scientific seminars and conferences on the selected problem, the development of methodologies and research technologies. In addition, many students participate in university research activities, as well as regular consultations via e-mail or teleconference using network technologies, conferences and seminars that serve as a good school to prepare students for research work. Students develop a culture of communication and communication in the process of mastering research methodology and technology.

In the seminars, students will make presentations, actively discuss approaches, methods, technologies to solve problems of interest to them, can summarize their initial theory and present the results of research. Young researchers learn to work with the scientific literature, develop research methods, analyze, collect data, draw conclusions, evaluate the decisions of other researchers.

No textbook or teacher can teach such a method of mastering knowledge, only students are sought in the process of solving problem situations and finding solutions to problems.

Teaching students to think creatively and logically leads to the acquisition of methods of mental activity, the formation and development in them of scientific, critical-analytical, logical thinking skills.

Ensuring students' continuity in the direction of research activities and the organization of continuous research on the basis of assignments, along with increasing their interest in the science of biology, helps to deepen the study of science, expand their scientific outlook [3].

Also, the use of Intellect Map in the development of research activities of the requirements gives effective results.

Mindmapping is a graphical way of representing information in logical and associative schemes in a way that is easy for a person to understand in the process of thinking [6].

This method helps to develop thinking, better understanding of complex topics, creating projects and intellectual development. An intelligence map reflects the thought process. When it begins, one thought brings others into the world. Any idea can develop infinitely in almost all directions. The main idea includes several major ideas, each of which, in turn, is defined in the form of smaller ideas. Every little idea is inextricably linked to a particular global idea. All this can be mapped. In carrying out these processes, students are directed to research activities. They have a passion for scientific research.

Learning how to make mental maps is not difficult at all, here are the basic steps:

- Brainstorming. It aims to search for the topic of the review, i.e. the main topic. Usually something shown in the center of the map.
- Fill. When the main idea is identified, the main themes related to it should be highlighted. They should have short names and create a map hierarchy. If the categories are too abstract, you need to attach pictures to them: this creates associations and allows for quick dissemination of ideas. Secondary themes are where ideas start to be created. Secondary topics should consist of one or two words. But if the card is simple (no more than three levels), it can be a secondary offer or a note.
- Identification. The third and subsequent levels are the process of identifying ideas. Here you can use descriptive phrases, notes, and links, as well as link map elements to each other. For example, you can define links between different ideas, notes, and links at different levels. This makes the map more logical.

Intellect - a map - shows a diagram in the form of a tree, connecting words, ideas, words, ideas, tasks or other concepts connected with branches from this central concept or idea with a central concept or idea using branches (wavy lines). [7].

The Intelligence Map was developed by Tony Buzen, an English writer, speaker, and consultant on intellectual issues, psychology teaching, and problem thinking. According to the

author, intelligence-mapping is a powerful graphical method, the universal key to awakening the hidden potential in the brain. This method can be applied to any area of life where the solution of various intellectual tasks or the improvement of an individual's intellectual capacity is required.

The process of creating mental maps itself is called mindmapping, and today it is recognized as a convenient and effective technique for visualizing thinking and alternative writing, in contrast to the use of diagrams in the traditional linear form.

Below we will get acquainted with the tasks for the development of students' research activities in the discipline of "Invertebrate Zoology" using intellectual maps.

"General concepts about animals. Laboratory training on the structure and distribution of "Animal Systematics" can be organized as follows:

Problem-solving research assignments

Assignment 1. Answer the questions.

Explain the following statements from a biological point of view:

1. Zoology is inextricably linked with other biological sciences, namely medicine, veterinary medicine and agriculture.
2. Paleozoology is the study of animals that lived in ancient geological times and are now extinct.
3. Physiology studies the functions of the animal body.
4. Objects of science - animals, the subject - the diversity of the animal world, the structure of animals, their way of life, distribution and relationship with the environment, the laws of private and historical development of animals.
5. autapomorphic (unique trait) - evolutionary novelty in ancestors
6. Synapomorphism (common genetic traits) is an evolutionary novelty in generations

Assignment 3.

Autapomorphism is an evolutionary innovation in ancestors,

Synapomorphism is an evolutionary innovation in generations,

Helminthology - parasitic worms,

Entomology - insects,

Acarology - canals,

Ichthyology - fish,

Ornithology - birds,

Theology is the study of mammals.

Assignment 4: The course information is presented in "General Concepts about Animals. Animal Systematics" intellectual map.

Use the following terms:

- autapomorphism - tour,
- synapomorphism - a series,
- helminthology - systematics,
- entomology - section,
- acrology - cell,
- ichthyology - the organism,
- Ornithology - birds,
- Theology - mammalian,

2. "General concepts about animals. Animal Systematics" intelligence map:

1. The science of zoology was formed as a science in the XIX century, what is the reason for this?

2. What is the relationship of zoology with other sciences?
4. The science of zoology and its functions....
5. System of zoological sciences... ..
6. Research methods of zoology....
7. Theoretical and practical significance of zoology... ..
8. Define the concept of "morphology"?
9. Define the concept of "anatomy"?
10. What does etiology study?
11. Define the concept of "physiology"?

HOMEWORK ASSIGNMENT. They write answers to the following questions.

1. The science of zoology was formed as a science in the XIX century. What is the reason for this?
2. What is the relationship of zoology with other sciences?

Developments in the development of students' research activities using intellectual maps are presented in Appendix 2.

Such assignments for the development of students' research activities have a positive impact on the intellectual development of scientific research.

The teaching of biological sciences allowed students not only to master the methods of knowledge and research activities, but also to demonstrate the ability to manage their own behavior and activities in different situations.

Thus, a well-organized research activity of a student in higher education is an important component of the formation of research competence. Its implementation and organization in the educational process is one of the main conditions for raising the level of research competence.

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