

Section 7. Specialized branches of pedagogy

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SCIENTIFIC-PEDAGOGICAL BASIS OF INSTILLING RESEARCH SKILLS TO STUDENTS IN TEACHING BIOLOGY IN SECONDARY SCHOOLS

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Abstract

The scientific-pedagogical basis of instilling research skills to students in the teaching of biology in general education schools was studied. The duties of education and education workers in this field have been clarified. The possibilities of solving the problem in the educational program and subject content are investigated. The difficulties faced by subject teachers in this field are summarized. The solution of the problem is approached from a psychological, scientific-pedagogical, methodical point of view. The characteristics of students' research skills are extensively analyzed. The scientific-pedagogical aspects of instilling research skills are explained. Pedagogical and methodical approaches to the development of students' creative activity and research skills are explained, and their opinions are summarized. Inconsistencies and contradictions in training are analyzed. The directions and ways of considering scientific-pedagogical, psychological, didactic factors in the formation of students' research skills are investigated. Effective recommendations are given that will help subject teachers to solve the problem.

Keywords: *biology, research, technology, observation, biological process, interactive learning, thinking, scientific cognition*

In recent years, reforms and projects aimed at the development of education have been implemented in Azerbaijan. The most important of these is the preparation and implementation of national and subject curricula for secondary schools. In the national curriculum, the characterization of subjects by educational levels and their general learn-

ing outcomes, the requirements of general education and general education graduates are justified. In accordance with its requirements, the content, learning strategy and evaluation rules are specifically specified in the subject curricula. It was noted that the main task of the Azerbaijani education system is to form young people as personalities

with deep and comprehensive knowledge, research skills, and practical training. In the biology subject curriculum, students' independent acquisition of knowledge and acquisition of research skills are the main tasks. Subject teachers have difficulties in fulfilling their duties, including teaching students research skills.

Thus, some teachers prefer ready-made knowledge, others rarely use research tasks, others do not solve the problem of preparing research questions and tasks, others do not distinguish between ordinary tasks and research tasks, tasks whose answers are in the text in lessons and do not need any research. and they use questions. All this requires conducting research on the elimination of such deficiencies in the teaching of biology, and shows its relevance.

Formation of research skills in the student in the teaching of biology in secondary schools:

- Conducting research, summarizing and presenting the obtained results;
- To observe, draw conclusions, make decisions;
- Prepare a presentation, project according to the topic;
- It awakens enthusiasm for operations such as conducting experiments, obtaining results, and implementing knowledge in practice.

A properly established training process serves to make maximum use of the potential opportunities of students, stimulates, organizes and regulates their activity, thereby having a significant impact on the development of children.

Psychologists' studies show that one of the important regularities of the process of acquiring new knowledge is the setting of a problem. Problem-based learning develops the student's thinking as the student, under the guidance of the teacher, solves it by engaging in inquiry. AM Matyushkin formulated an important thesis that the way of managing the process of mastering the system of knowledge and methods of mental activity is the application of the problem situation. He shows the presence of five stages in this process: a) creation of a problem situation and problem setting; b) use of important methods of solution; c) expansion of the area of search

for new solutions; d) realization of the found principle; e) checking the correctness of the solution (Matyushkin A. M., 1968, p. 68).

1) Problematic nature of new material; 2) It is important to create a demand for new knowledge, to connect intellectual activity with motives, cognitive needs and emotional relationships (Bogoyavlensky D. N., Menchinskaya H. A., 1960, p. 266–267).

According to the authors, the modern school faces three tasks: 1) mastering a certain amount of knowledge; 2) mental development; 3) creation of cognitive motives. Each of these tasks has its own solution. One of those ways is the organization of student research.

Psychological science confirms that personality activity is manifested in its activity in the process of interaction with the surrounding world. The source of personality's activity is its demand. It is the trap that provokes a person to do work in a certain way and in a certain direction. Demand is a state of the personality, it expresses its dependence on specific conditions of existence, it emerges and changes as a source of activity of the personality. Satisfying demand is one of the most important conditions for the comprehensive development of personality.

Curiosity not only directs all mental processes in a certain direction, but also strengthens the personality's activity in the direction corresponding to the interest. When a person works with interest, he is comfortable and productive. Because at this time his attention is focused on his work and all his strength is concentrated for work (Curriculum for secondary schools of the Republic of Azerbaijan. 2013, p. 630–631).

Curiosity is both a prerequisite and a consequence of learning. Learning relies on children's interest and shapes interest, so interest is a tool used by educators to make learning more effective. On the other hand, interest, its formation is the goal of pedagogical work. The formation of various interests is the most important educational result of training. It is interest that leads students to research. However, interest in learning and first of all cognitive interest is not formed automatically. For this, special pedagogical influence, approach and methods are required, which give a certain direction and accelerate the emergence of interests in general, especially

cognitive interest. Pedagogical processes should accelerate the formation of interests (Bogoyavlensky D. N., Menchinskaya H. A., 1960; Curriculum for secondary schools of the Republic of Azerbaijan. 2013, p. 31).

It is known that didactics, which is an important field of pedagogy, intervenes in all issues related to training and education. Because its main goal is to discover the regularities of the training process, and on this basis, to determine the ways and conditions that ensure the maximum effective assimilation of the content of education by students, their upbringing and development. These ways and conditions are different, but the preparation is not smooth, there are many difficulties and contradictory points.

One of the first to pay attention to the existence of inconsistencies in training was V. I. Voytulovich was. He investigated the discrepancies that occurred. It systematizes those inconsistencies as follows:

1) Logical, consistent, systematic explanation of the teaching material by the author and very complex, incoherent, intermittent, unsystematic assimilation of that material by the students;

2) When the teacher explains the material to be studied, the student must fully understand it;

3) is not understood by the student;

4) Ignoring the practical application of theoretical knowledge;

5) The student's newly acquired knowledge should not be connected with previous knowledge;

6) The disconnection of the new, changed requirements with the established working and learning habits of the students;

7) are unable to express it (Hajiyeva H. M., Ibrahimova J. H., Gafarova P. M., Abdullayeva S. V., Ahmadova A. I., 2011, p. 67).

V. I. Zagwiazinski's judgment fills this gap to some extent. He gave such a unique classification of contradictions. So, the contradictions that arise:

1) Derived from the purpose of the training;

2) In the essence of training;

3) In the content of the taught material;

4) in the application of training methods;

5) It is divided into five parts related to the organization of the training.

B. Ahmadov also touched on the issue of contradictions and driving forces of the training process. He writes that the specific contradiction in the learning process is the contrast between the teacher's ability to teach and the student's ability to learn. He explained the forms of contradictions as follows:

1) The teacher teaches a lot, the student receives less (or cannot receive), this situation shows itself when the real intellectual level of the student is low.

2) The teacher teaches less, but the student wants to learn more. This is manifested when the student's development is above the level of the program.

BA Ahmadov, A. I. In the work he published together with Hajiyev (Ahmadov B. A., Hajiyev A. I., 1993, p. 208) clarifies the contradictions of education and training. He stated that the specific and main contradiction of education consists of the contradiction between the existing knowledge of the student and the concepts that he does not know, the skills and habits that have already been formed and the newly formed skills and habits, and the non – basic (derivative) contradictions that follow from this main contradiction indicates that it has arrived:

1) the conflict between knowledge and skill; the contrast between skill and habit;

2) the contrast between perception and understanding; the conflict between understanding and application, etc. (Ahmadov HH Pedagogy (textbook), p. 251).

MA Danilov from his research, he comes to the conclusion that the conflict between the tasks encountered in the course of training and the existing cognitive power of the students should be emphasized and resolved based on the teaching of dialectics about contradictions. Contradictions become the driving force of training under a number of conditions. So that:

Students' understanding of the difficulty and the necessity of its elimination;

Correspondence of the limit (i.e. size) of difficulty in terms of cognitive capabilities to strength;

– Conditioning and preparation of contradictions with the course and logic of the educational process;

Teaching new material, whatever distracts the student from solving the cognitive

stages, all of them should be completely removed from the student's field of vision;

– The decisive condition for the formation and emergence of the conflict and the driving force of the training is that the conflict is perceived by the student as a difficulty by gaining internal character importance in the consciousness of the student and his personality as a whole (or arising) (Ismikhanov M., 2011, p. 131).

Conclusion

The role of problem questions in increasing the cognitive activity of students is great. Those questions are problematic, the answer to which causes a certain degree of intellectual difficulty for the student. A problematic question differs from an ordinary informative one, it contains an unsolved problem, unknown new knowledge, any necessary

intellectual activity for their acquisition, a mental process directed to a certain goal. This is done by organizing student research.

The problematic question is the verbal expression of the problem, which has a certain logical and psychological content. Problem questions:

– with previously acquired concepts, ideas, topics (participating in the implementation of the assimilation); such processes arise only in a certain educational situation;

– contains a cognitive challenge, the answer to which is obtained by a number of mental operations (argument, generalization, systematization, etc.);

– it is connected with the emotions of the students, when comparing the previously known with the new, the existing knowledge, skills and habits reserve is enough, it creates a feeling of surprise.

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