Practical-oriented teaching of gifted youth in the field of natural sciences

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Abstract. In the article it is presented the author's concept of practice-oriented teaching of gifted adolescents to natural-science subjects on the example of chemistry. The main provisions of the concept are substantiated, on the basis of which individual educational trajectories have been developed. The essence of practice-oriented learning is revealed. Particular emphasis is placed on the formation of practical experience in applying theoretical knowledge to solve specific problems.

1. Introduction
Today, in the pedagogical science and practice of education, the problem of identifying, developing and supporting gifted youth is increasingly recognized. Educational institutions for gifted adolescents are being established [5], developing programs and technologies for teaching in schools [4] and universities [1, 3, 6] are being introduced, the results of scientific research of young scientists are published [2].

However, there is clearly not enough publications on the scientific generalization of the experience of practice-oriented instruction in the natural sciences of gifted young people. Working with gifted young people requires a clear scientific and pedagogical concept, the development of pedagogical conditions for the effectiveness of an individual practice-oriented educational trajectory. This article can be considered as one of the attempts to find ways to solve the above problem.

2. The basic part
To identify and further successful training of gifted youth requires a comprehensive study of their characteristics and abilities. This is necessary for the development of individual training programs, both for gifted adolescents, and for improving the skills of teachers working with them.

The methodological basis of our studies is the competence-activity approach, which assumes general cultural and personal development of the individual, the construction of the educational process, taking into account the individual age and psychological and physiological characteristics of gifted youth. This approach has allowed to develop the concept of practice-oriented training of gifted adolescents, based on the theses: "acceleration, deepening, enrichment, problematization". The concept was implemented in the IT Lyceum of the Kazan Federal University in the development of individual educational programs for teaching gifted young people to natural-science subjects.

The essence of the concept will be considered on the example of a curriculum in chemistry.

The first thesis of the concept - "acceleration" allows to take into account the needs and opportunities of the lyceum students, distinguished by the accelerated rate of development. In the Lyceum with gifted children, the teacher-trainer is engaged in the subject. He accompanies the training of a
teenager, helps to highlight his characteristics and develop an individual trajectory of learning. In consequence, he tracks the results of the activities of a teenager, creates a data bank. In addition, the teacher-trainer participates in the development of an innovative educational program. The program includes the following components: goals, thematic planning, informative (Olympiad) component of the program, use of innovative pedagogical technologies in the learning process. The developed subject (profile) individual trajectory of the development of a gifted adolescent involves monitoring the development of a teenager, taking into account his personality.

Realization of the second thesis "deepening" implies a more in-depth study of topics or different fields of knowledge, taking into account the interests (profile) of a gifted teenager. The deepening of the material is achieved by working in small groups, where dialogue is the basis of activity. Dialogue serves as a means of identifying the problem and the ways to solve it. At this stage, a full cycle of research activities is carried out: from obtaining in-depth subject knowledge and highlighting the educational and research problem to its applied solution.

The third thesis of the concept - "enrichment" - requires the use of innovative pedagogical technologies. The study of many topics takes place in accordance with the principle of integrating the profile subject with other subjects of the natural and humanitarian cycle. For example, integrated lessons of chemistry and English are conducted.

The implementation of the fourth thesis of "problematization" actualizes the development of the personality of a gifted teenager through the search for new meanings, alternative interpretations, the development of reflection. The lyceum should be aware of the importance of the problem of professional and social self-determination of young people in the context of continuity of secondary and higher education. He must be informed that for the implementation of the innovative individual educational trajectory for him all conditions are created.

An important factor in the implementation of the developed concept is the availability of a practice-oriented educational environment. Practically oriented environment, in our opinion, influences the formation, realization, disclosure, self-improvement of gifted youth. In general, the practice-oriented education is aimed at acquiring practical experience in order to achieve professionally and socially significant competencies. This ensures the motivation and involvement of students in the study of theoretical material for the successful solution of a practical problem.

In general education, the experience of activity implies a greater degree of experience in teaching and cognitive activity in lessons. The acquisition of experience is carried out within the framework of the traditional didactic triad of "knowledge-skills-skills" by developing practical skills in students. In practice-oriented learning, this triad is supplemented by a new didactic structure: "knowledge-skills-skills-experience".

Undoubtedly, the knowledge acquired by gifted young people in chemistry is characterized by the so-called "situational dependence". Otherwise, the students' knowledge does not belong to them, but to the situation in which they are usually required. In order for knowledge to become own, "subjectivation" is necessary. This means applying knowledge in non-standard situations. In general, the application of knowledge involves teaching students how to solve problems, both in typical and in new non-standard situations. In the conditions of practice-oriented learning, the skills of using new knowledge on the subject are formed to solve problems of various difficulties in non-standard situations.

The essence of practice-oriented learning is to build an educational process on the basis of the unity of the emotional-figurative and logical components of content in order to acquire new knowledge. An important point is the formation of practical experience in using this knowledge to solve specific vital problems. In this case, the inclusion of subject knowledge in the system of value knowledge, freely functioning in human life.

Thus, the developed concept is based on the following principles: training in the context of vital problems, professional and applied orientation, intersubject communications. The concept of "acceleration, deepening, enrichment, problematization" considers the interaction of the teacher and the student as two interlocutors, partners who have the right to make their own decisions. As a result,
motivational, synthetic (constructive), innovative stages are always highlighted in the lessons. The presence of these interconnected stages allows satisfying the interests of students with left-brain thinking (the material presented in the form of schemes, tables, algorithms is preferable), and with right-brain thinking (the form of presentation of the material in the form of images, associations, analogies).

Thus, in the developed concept of training, logical and figurative thinking is used, which helps to increase the personal status of the adolescent. Training becomes motivated, individually oriented. The social function of education is realized, students are provided with applied knowledge and skills. The formation of a practice-oriented educational environment is provided by the developed practical-oriented situational tasks. These tasks begin with the problematic "why". The process of solving such problems significantly increases the interest of students. They are easily involved in the discussion, the dialogue.

The third year in the IT-lyceum for gifted adolescents of the Kazan Federal University in the lessons of chemistry is practiced practice-oriented training. The work program was compiled by the teachers of the Chemical Education Department named after A.M. Butlerov Kazan State University. Students of the 10th, 11th grades of the lyceum of the chemical and biological profile visit the university's laboratory once a month for practical classes. Students of 10 classes are engaged in the analysis and synthesis of organic compounds, solve experimental problems, identify organic compounds. Lyceum 11 classes receive gases and study their properties, get acquainted with the methods of purification of substances.

Thus, there is a systematic formation of practical experience in the use of theoretical chemical knowledge in solving specific vital problems. At the same time, the subject knowledge is included in the value system of the individual educational trajectory of the lyceum student.

The conclusion. On the basis of the competency-activity approach, the author's concept of practice-oriented teaching of gifted adolescents to natural-science subjects on the example of chemistry was developed and implemented. The main provisions of the concept are substantiated, which can be presented in the abstract as "acceleration, deepening, enrichment, problematization". The essence of practice-oriented learning, consisting in the construction of the learning process on the basis of the unity of the emotional-figurative and logical components of the content with the purpose of acquiring new knowledge, is disclosed. Particular emphasis is placed on the formation of practical experience in solving specific vital problems.

References

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