FORMATION OF RESEARCH COMPETENCES OF PUPILS OF 8-9 GRADES WHEN CARRYING OUT RESEARCH PROJECTS IN BIOLOGY

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Abstract. Research literacy is a key concept in the students' project work. It is characterised by universality, metasubject, non-algorithmic character. Methods and techniques for developing research competence in students in grades 8-9 in the process of studying biology can be diverse and depend on the preferences of the teacher and the characteristics of the children. However, the correct choice of their combination contributes to the formation of a number of universal educational skills and also significantly increases the motivation of students to study the subject in depth.

Keywords: research competence, universal learning activities, project, Scientific research.

In recent decades, in pedagogical literature the ideas of building the educational process on the basis of project-research activities have been appearing more and more often. The founders of the activity approach in teaching believe that learning new knowledge is accompanied by constant work and the use of theory in practice. Scientists believe that a person learns best the knowledge that can be applied in real practical tasks. In this way, an inseparable link between theory and practice is realised, and the activity approach is formed. The founders and followers of this approach are the following scientists: S.L. Rubinstein, A.N. Leontiev, L.S. Vygotsky, M.Y. Basov [6, p. 81] and others. The project method is universal and can be applied in the study of any subject, both in lessons and in extracurricular activities. However, the problem of forming research competence in the implementation of project-research activities in biology by secondary school students is still insufficiently studied [5, p. 68].

Competence is a set of ways of doing things which result in the productive performance of research activities. It includes: abilities, skills, knowledges, skills and understanding. In its essence, this concept reflects the researcher's readiness to act and apply various forms of activity to solve a particular research or problem situation. As a rule, it is reflected in person-centred activity and allows the researcher to realiseits research capacity [1, p.48].

Research competence is an individual's ability to productively apply available knowledge and experience in the course of research activities and to solve educational, practical, professional and scientific problems [2, p. 100].

The experimental part of the study was divided into 3 stages: the ascertaining stage (determining the level of research skills of schoolchildren); the forming stage (creating the necessary pedagogical conditions for the formation of research skills); control (monitoring the dynamics of research skills indicators in schoolchildren).

At the first stage of the study, all participants of the experiment were tested for the presence and degree of research skills development. Methods aimed at diagnosing the level of research skills development in schoolchildren were selected and the results were analysed.

As a basis for diagnostics, we took 9 criteria identified by A.A. Ostrovskaya in the real educational environment [4, p.17]: ability to see the problem (Methodology: R.S. Nemov «Verbal Imagination»); ability to ask questions (Methodology: subtest No. 6 of E. Torrence «Unusual Questions»); ability to put forward a hypothesis (Methodology: A.I. Savenkova); ability to define concepts (Methodology: R.S. Nemov «Definition of Concepts»); ability to classify (Methodology: L.I. Peresleni, L.F. Chuprov «Exclusion of Concepts»); the ability to observe (Methodology: L.F. Tikhomirova); the ability to experiment (Methodology: J. Guilford subtest «Use of objects»); the ability to structure the material obtained in the course of research (Methodology: L.F. Tikhomirova); the ability to draw conclusions and inferences (Methodology: E. Zambatsiaviciene, L.F. Chuprova subtest «Inferences»).

At the second stage, as part of extracurricular activities, pupils were offered to participate in writing research projects in biology. For 9th grades this proposal was relevant, as pupils need to defend their individual final project at the end of 9th grade. In 8th grades pupils start preparing for the defence of individual projects in advance [3, p. 85]. At the beginning of the school year, children decide the topics of biology research in accordance with their interests. The pupils chose the following areas: botany, agriculture, microbiology, physiology, psychology and hygiene. They worked on project works individually. Independently fulfilling all the functions to achieve the final result. The topics chosen were: «Separation of pigments of leaves of indoor plants by paper chromatography», «Features of thinking style in schoolchildren of adolescence», «Handwriting analysis as a tool of psychodiagnostics of personality», «Formation of self-esteem of a teenager under the influence of peer group», «Rabies virus. Dynamics of development in the Belgorod region», «Study of aggression detection in adolescence», «The influence of colour on the psyche and human activity», «Monitoring of the cardiovascular system of schoolchildren of the class», «Vitamins and their importance in human life», «Study of the influence of different types of cream on the skin condition», «Modern ideas about the physiological arrangement of sleep and dreaming», «The influence of biological additives on the immune system of chickens», «The influence of biological protection of plants on the quality of agricultural products on the example of cultivation» .

At the third (control) stage of the experiment it was necessary to reveal the dynamics of the level of development of pupils' research skills in extracurricular project activities in biology and to determine the effectiveness of the forming experiment. At this stage of the experiment, the students were retested using the same methods that were used at the formative stage.

The experimental part was conducted on the basis of the "Mayskaya Grammar School" from September 2022 to March 2023. The experiment involved 30 students of the 8th grade and 30 students of the 9th grade. Among them: 15 girls and 15 boys from 8th grades and 15 girls and 15 boys from 9th grades. The average age of schoolchildren is 14-15 years old. According to the results of the practical research, we have received the following average indicators of 4 groups of subjects: indicators of the ability to see the problem increased on average in girls of 8th and 9th grades by 16.7% and 26.7% respectively, and in boys of 8th and 9th grades by 18% and 26.6%; indicators characterising the ability of students to formulate questions competently increased in girls of 8th and 9th grades by 23.3% and 20.6% respectively, and in boys of 8th and 9th grades by 26.7% and 20%; indicators characterising the ability to formulate a hypothesis increased by 16.65 per cent and 16.1 per cent for girls in grades 8 and 9, respectively, and by 22.6 per cent and 18.5 per cent for boys in grades 8 and 9; indicators of the ability to give correct definitions of concepts increased for 8th and 9th grade girls by 30.3% and 37.7%, respectively, and for 8th and 9th grade boys by 30.7% and 30%; indicators of the ability to classify increased for 8th and 9th grade girls by 5.1% and 6.3%, respectively, and for 8th and 9th grade boys by 5.7% and 9.2%; Observation skills increased by 27.5 per cent and 24.7 per cent for girls in grades 8 and 9, respectively, and by 19.4 per cent and 22 per cent for boys in grades 8 and 9; experimentation skills increased by 10.7 per cent and 23.7 per cent for girls in grades 8 and 9, respectively, and by 17.7 per cent and 12.6 per cent for boys in grades 8 and 9; indicators of the ability to structure the information obtained as a result of the research in girls of grades 8 and 9 increased by 22.3 per cent and 36.6 per cent respectively, and in boys of grades 8 and 9 by 31.3 per cent and 24.4 per cent; indicators of the ability to draw conclusions and make inferences in girls of grades 8 and 9 increased by 8.0 per cent

and 10.7 per cent respectively, and in boys of grades 8 and 9 by 10.25 per cent and 12.38 per cent; indicators of the ability of students to structure the material obtained in the course of the research increased in the group of girls by 18.51 per cent. In turn, the indicators of the ability to make conclusions and inferences were on average 20.15 per cent higher in both groups compared to the data of the initial stage.

The study of the formation of research competence in pupils of 8-9 grades in the course of project-research activities was carried out through the preparation of students of 8-9 grades of the «Mayskaya Grammar School» for the defence of final research project works.

As a result of working on projects, children were able to develop the ability to work with information, to see the actual problem, to formulate a hypothesis correctly, to observe, classify and structure the information obtained, to make conclusions and inferences. The pupils have formed a research type of thinking. At the end of the work, 9th grade students were able to successfully defend their research projects, and 8th grade students prepared for next year's defence and actively participated in researchcompetitions.

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